DIVISION 2 EARTHWORK

SECTION 2-01 CLEARING, GRUBBING, AND ROADSIDE CLEANUP

2-01.1 DESCRIPTION

2-01.1(1) GENERAL

Section 2-01 describes work consisting of clearing, grubbing, and roadside cleanup including protecting from harm all trees, bushes, shrubs, or other objects identified in the Contract to remain.

2-01.1(2) CLASSIFICATION

Clearing: removing and disposing of trees, vegetation or other unwanted materials from the ground surface.

Grubbing: removing and disposing of the same materials from below the ground surface.

***Roadside cleanup**: cleaning and maintaining the roadside to an attractive appearance*.

2-01.2 BORROW AND DISPOSAL SITES

Unless otherwise specified in the Contract, waste sites for the disposal of debris from clearing, grubbing and roadside cleanup shall be provided by the Contractor.

The Contractor shall be allowed to sell all usable material such as timber, chips or firewood produced by clearing, grubbing, or roadside cleanup. The Contractor shall not allow the public to fell trees.

At the Pre-Construction Conference, the Contractor shall submit to the Engineer a list of Waste sites, borrow sites, and reclamation plans for pits including copies of permits the Contractor proposes to use during the course of construction *(see Section 1-08.1(2))*. The list shall identify each location, the estimated quantities and type of material to be wasted or removed from each site. Should additional or alternate sites become necessary during the life of the Contract, the locations and information for each site shall be submitted to the Engineer for approval at least 10 Working Days prior to their use.

The selection of Waste and borrow sites and their operation shall at all times be subject to the approval of the Engineer. No waste or borrow site shall be utilized by the Contractor until the proper grading permits and property owner agreements have been obtained by the Contractor and copies submitted to the Engineer. Utilization of a site without a legal grading permit, a consent Agreement from the property owner, and approval of the Engineer will be considered unauthorized.

Waste sites located within the City limits of Seattle are subject to the rules and regulations set forth in Seattle Grading and Drainage Control Ordinance (Ord. No. 108080 as amended by Ord. No. 111043, or as otherwise provided in the Seattle Municipal Code 22.800) and shall require a grading permit issued to the property owner by the Director of Construction and Land Use.

Waste sites located outside the City limits of Seattle but within unincorporated King County, shall be subject to the rules and regulations set forth in the King County Grading Ordinance (Ord. No. 1488). Sites may also be subject to rules and regulations of a local governmental authority if located within its jurisdiction.

Effective June 1, 1991 and in accordance with SMC 21.36 as amended by Ordinance 115589, no Waste generated within the City of Seattle shall be deposited in a Waste disposal facility owned and operated by King County.

Waste that is Unacceptable Waste *shall* be disposed of in accordance with all applicable local, State and federal regulations. Waste that appears to be an Unacceptable Waste *shall* obtain a Waste Clearance through the Seattle-King County Department of Public Health (SKCDPH). A sample of the Waste Clearance Program Instructions and forms is provided in the Appendix. Additional copies of the forms or information regarding the forms may be obtained by calling SKCDPH at 206-296-4633.

A list of some disposal options and approximate rates will be provided in the Appendix of the Project Manual. Also provided will be a list of recycling and disposal sites. The information provided is for the convenience of the Contractor. It is the responsibility of the Contractor to verify the accuracy of this information prior to Bid.

2-01.3 CONSTRUCTION REQUIREMENTS

2-01.3(1) CLEARING

Clearing shall consist of removing and disposing of all unwanted material from the surface including, but not limited to, trees 6 inch and less in diameter measured at a point one foot above the ground, brush, downed timber and rotted wood, rubbish, etc.; removing building sheds, fences, and other obstructions interfering with the Work when removal and disposal of such surface obstructions are not specifically provided for in Section 2-02; and protecting from all harm any trees, bushes, shrubs, or other existing improvement which are to remain. *Trees greater than 6 inch in diameter measured one foot above the ground shall remain unless marked for removal on the Drawings (see Section 2-02.3(3)I).*

If branch trimming is required of trees that are to remain, it shall be done in accordance with Section 1-07.16(2).

Trees marked for removal shall be felled within the area to be cleared. Where the tree or tree limb structure interferes with or is in close proximity to utility wires, the Contractor shall comply with the requirements in Section 2-02.3(3)I.

All buildings, fences, lumber piles, trash, and obstructions, except utility poles, within the area to be cleared shall be removed and disposed of by the Contractor. *Burning will not be allowed*.

The refuse resulting from the clearing operation shall be disposed of by the Contractor. *Refuse material shall not be left on the Project Site, shoved onto abutting private properties, or be buried in embankments or Sewer trenches on the Project Site. See Sections 1-07.5 and 1-07.24 regarding prevention of pollution and private property cleanup*.

2-01.3(2) GRUBBING

The work shall consist of removing and disposing of all unwanted vegetative matter from below the surface including, but not limited to, stumps, roots, buried logs and timber, etc.; and removing and disposing of drains, culverts, wood catch basins, foundations, stairways, steps, and such other obstructions that interfere with the Work but whose removal and disposal are not specifically provided for in Section 2-02.

All stumps, roots, foundations and planking embedded in the ground within the limits described in the *Contract* shall be removed to a minimum depth of 2 feet below Subgrade or 2 feet below existing ground level, whichever is lower. Disposal requirements for grubbing shall be the same as those described for clearing.

Removal of tree stumps in improved areas as part of grubbing operations shall comply with Section 2-02.3(3)I.

2-01.3(3) LIMITS OF CLEARING AND GRUBBING

The limits of clearing and grubbing shall be as indicated *in the Contract*.

2-01.3(4) ROADSIDE CLEANUP

See Section 1-04.11.

2-01.3(5) PROTECTION OF EXISTING IMPROVEMENTS

See Section 1-07. See Section 2-02.3(3)I for requirements regarding tree trimming or removal near overhead wires.

2-01.4 MEASUREMENT

Bid items of Work completed pursuant to *the Contract* will be measured as provided in Section 1-09.1, Measurement of Quantities, unless otherwise provided for by individual measurement paragraphs *herein* this Section.

Measurement for "Clearing", for "Grubbing", and for "Clearing and Grubbing" will be by lump sum or by the square foot as indicated in the Bid Form.

2-01.5 PAYMENT

Compensation for the cost necessary to complete the work described in Section 2-01 will be made at the Bid item prices Bid only for the Bid items listed or referenced as follows:

1. "**Clearing**", per square foot, or per lump sum.
2. "**Grubbing**", per square foot, or per lump sum.
3. "**Clearing and Grubbing**", per square foot, or per lump sum.

The Bid item prices for "Clearing", for "Grubbing", and for "Clearing and Grubbing" shall include all costs for the specified work.

*4. **Other payment information**.*

If the Bid Form does not include a Bid item pertaining to the work of "Clearing", "Grubbing", or "Clearing and Grubbing", then this work shall be considered included in the Bid item prices of the various Bid items and no separate or additional payment will be made.

All costs for roadside cleanup shall be considered included in the Bid item prices for the Work.

All costs involved in securing, operating and maintaining any Waste or borrow site, including related final cleanup, and any erosion or anti-pollution controls required in related permit(s), related property owner agreements, related grading regulations, or other related Contract requirements, shall be considered included in the Bid item prices for the Work and no separate or additional payment will be made.

SECTION 2-02 REMOVE, ABANDON, OR RELOCATE STRUCTURES AND OBSTRUCTIONS

2-02.1 DESCRIPTION

Section 2-02 describes work consisting of removing and disposing of, or salvaging or abandoning, selected items identified in the Contract located within a Right of Way or an area of existing Improvement. The work also involves backfilling of trenches, holes or pits resulting from the removal of such existing improvements.

2-02.2 MATERIAL

Materials shall meet the requirements of the following Sections:

Cement Concrete Pavement	5-05
Aggregates	9-03

Concrete for plugging pipe ends and for filling inlets shall be Class 5 (3/4) (see Section 5-05.3).

Backfill Material for filling structure voids and Structures (other than inlets) shall be *either Mineral Aggregate* Type 9 or Type 17 meeting the requirements of Section 9-03; selected Material excavated on the Project Site; or such other Material as designated *in the Contract*.

2-02.3 CONSTRUCTION REQUIREMENTS

2-02.3(1) GENERAL REQUIREMENTS

With certain exceptions, the Contractor shall raze, remove, and dispose of all buildings and foundations, structures, fences, and other obstructions that lie wholly or partially within the Right of Way. *The exceptions are public and private utility-owned equipment, and other items identified in the Contract*.

The Contractor shall:

1. Remove foundations to a depth of at least 5 feet below finished ground elevation or Subgrade elevation, whichever is lower.
2. Break up basement floors to promote drainage.
3. Fill basements or other cavities left by the removal of Structures. The fill shall match the level of surrounding ground. Any such fill within the slopes of the Roadbed shall be compacted to meet the requirements of Section 2-03.3(14)D, Method B.
4. *Notify the Engineer of construction near existing survey monumentation, or removal of pavement containing existing survey monumentation, as required in Sections 1-07.28 item 16 and 1-07.16(1).*

When salvageable material is to remain Owner property, the Standard Specifications, unless otherwise specified in the Contract, will identify the material and removal requirements. Such material shall be either stored on the Project Site or delivered to a location identified in these Standard Specifications unless the Contract specifies otherwise.

Any material not named in these Specifications or in the Contract as Owner property will belong to the Contractor. The Contractor shall store or dispose of such material so that it cannot be seen from any public Highway.

The Contractor shall dispose of surplus material or debris per Section 2-01.2. The Contractor shall not under any circumstance dispose of surplus material or debris within a wetland as defined in Section 2-03.3(7). Trench excavation over 4 foot in depth shall comply with the *safety* requirements of Section 7-17.3(1)A7a.

Utility cuts and other openings in Seattle's Streets, Alleys and other public places for construction or other activities shall comply with the "Street and Sidewalk Pavement Opening And Restoration Rules".

2-02.3(2) REMOVAL OF BRIDGES, BOX CULVERTS AND OTHER DRAINAGE STRUCTURES

In salvaging any steel or wooden bridge that will remain Owner property, the Contractor shall prevent unnecessary damage to the material. Steel members shall be match-marked.

Unless otherwise specified in the Contract, the Contractor shall remove foundations of existing Structures to a point 2 feet below the finished ground level, the adjacent ground level, or the natural stream bottom whichever is deepest. If a foundation lies wholly or partially on the site of a new structure, it shall be removed to a level that accommodates building the new structure.

Any blasting shall be subject to the requirements of Section 1-07.22. The Contractor *shall* complete all blasting before the placement of new work.

2-02.3(3) REMOVAL OF EXISTING STREET IMPROVEMENTS

2-02.3(3)A REMOVE NON-RIGID PAVEMENT AND UNTREATED ROADWAY SURFACES

Non-rigid pavements are defined as Streets, driveways, Alleys, sidewalks or other surfaces constructed from a bituminous mix, or any combination of bituminous mixes or surface treatments, upon an earth or granular base. Non-rigid pavement does not contain Portland cement concrete. Untreated Roadway surfaces are defined as oil mat, crushed rock, and gravel surfaces. Untreated Roadway surfaces shall not be considered pavements.

Removal of non-rigid pavements and untreated Roadway surfaces shall be considered part of the work of excavation. Removal shall be to the limits shown in the Standard Plans.

Non-rigid pavement shall be precut full depth prior to removal by use of an asphalt cutting wheel, sawcutting, or line drilling at the Contractor's option to ensure a neat straight line.

2-02.3(3)B REMOVE ASPHALT OVERLAY

When removing an asphalt overlay from a rigid base pavement, the Contractor shall use methods and Equipment that do not structurally damage the existing rigid base.

2-02.3(3)C REMOVE RIGID PAVEMENT

Rigid pavements are *Street*s, driveways, *Alley*s and other rigid slabs *over 4 inches in concrete thickness*, constructed from cement concrete with or without brick, cobblestone or asphalt overlay or any combination of these materials.

In trenching operations, rigid pavement shall be removed to a width equal to the neat line trench width as shown in Standard Plan nos. 404a and 404b.

After removal and before restoration, the Contractor shall trim the edges of the remaining pavement leaving clean vertical faces.

Rigid pavement shall be line drilled, or saw cut (see Section 2-02.3(6)) at the Contractor's option unless specifically required in the Contract. No sawing or line drilling is required where pavement removal extends to joints or cracks.

After line drilling or saw cutting the pavement, the Contractor shall not proceed with pavement removal *until the Contractor has demonstrated acceptable results to the Engineer*, the method used to break and remove the concrete pavement does not damage existing utilities or pavement that is to remain in place. A backhoe may be used to remove broken

concrete only after the concrete portion that is to be removed is clearly broken away from the pavement that is to remain in place.

Use of a "headache ball" to break concrete pavement will not be permitted.

2-02.3(3)D REMOVE CATCH BASIN, SANDBOX, VALVE CHAMBER, MANHOLE, OR INLET

The Contractor shall excavate and completely remove the structure including casting and outlet trap, concrete encasement, and bricks, as applicable to each removal Bid item.

Connecting pipes shall be plugged in accordance with Section 2-02.3(5)B. *Backfill shall be with selected material compacted to meet the requirements of Section 7-17.3(3).*

2-02.3(3)E CURB REMOVAL AND CLASSIFICATION, AND REMOVE CURB AND GUTTER

Curb removal will be classified as Class A or Class B. Class A curb removal is removal of the curb and preserving the pavement slab or rigid base material below the curb. Class B curb removal is removal of the curb and the underlying pavement if any, along the vertical plane of the face of the curb.

Removal of curb placed on top of rigid pavement or on top of rigid base shall be Class A, and removal of full depth curb shall be Class B curb removal. Removal of curb for construction of curb ramps, driveways, and monolithic curb and sidewalk shall be Class B curb removal irrespective of the type of curb to be removed.

Curb shall be sawcut at the neat line limits of removal, or removed to the nearest joint at the Engineer's option.

See Section 2-02.3(7)E for additional requirements when salvage is applicable.

2-02.3(3)F REMOVE SIDEWALK

Sidewalk removal, both asphalt and concrete, shall be as indicated on the Drawings.

Sawcut shall comply with the requirements of Section 2-02.3(6) and shall leave straight edges and vertical faces. The minimum width of all longitudinal cuts shall be two (2) feet or to the nearest score line.

2-02.3(3)G REMOVE ELECTRICAL AND TRAFFIC CONTROL DEVICES

The Contractor shall submit a written schedule for removing the existing *Traffic control and electrical* systems to the Engineer for approval at least 5 Working Days prior to proceeding with the removal.

The Contractor shall notify the Engineer 3 Working Days prior to any removal of *Traffic* signals in which no *Traffic* signal devices are to be reinstalled. Within 3 Working Days after the removal, the Contractor shall again notify the Engineer, in writing, stating the location, exact date and time of the actual removal.

The Contractor shall remove equipment from the span wire before the span wire is disconnected from the poles. Existing span wire shall not be cut without first releasing the tension in the span.

2-02.3(3)H REMOVE GUARD RAIL

Removal of the various types of guardrail and anchors shall include removal of the rail, cable elements, hardware, posts, concrete bases, and steel tubes. *All holes resulting from the removal shall be backfilled with native Material compacted in 6" layers with each layer compacted to 95% as determined in Section 2-03.3(14)E. The removed guardrail items, if reusable as determined by the Engineer, shall be delivered either to the Charles Street Facility or to the Haller Lake Facility whichever facility is nearest the guardrail to be removed.* Damaged and unusable items shall be disposed of by the Contractor.

2-02.3(3)I REMOVE TREE

Trees which are greater than 6 inch in diameter at one foot above the ground and marked for removal will be indicated on the Drawings. The Contractor shall notify the Engineer at least 2 Working Days in advance of tree removal.

The Contractor shall comply with Section 1-07.16(2) whenever tree trimming or removed is near overhead wires.

In unimproved areas, removal of the tree shall include complete removal of the stump.

In improved areas, stump removal shall be by grinding and removing the stump to an 18 inch depth below finished grade, unless specified otherwise in the Contract.

2-02.3(3)J REMOVE PAVEMENT MARKING

Pavement paint and thermoplastic stripes and markings, traffic buttons, and lane markers to be removed as indicated in the Contract shall be obliterated until blemishes caused by the pavement marking removal conform to the coloration of the adjacent pavement. Traffic button and lane marker removal shall be incidental to pavement marking removal. If the pavement is materially damaged by pavement marking removal, such damage shall be repaired by the Contractor in accordance with Section 1-07.13. Sand or other material deposited on the pavement as a result of removing pavement markings shall be removed as the work progresses to avoid hazardous conditions. See Section 1-07.5 regarding pollution control requirements.

2-02.3(3)K REMOVE SIGN AND POST

Removal of the various types of signs and hardware shall include patching the holes with a suitable material flush with existing surface. Removal of posts in earth shall be backfilled with suitable native Material in 6" layers with each layer thoroughly compacted. Removal of posts and concrete foundations from sidewalk or other improvement shall include the removal and replacement of surrounding improvement to a reasonable extent accommodating the complete removal. The Engineer may direct additional removal to a joint. Damaged and unusable items shall be disposed of by the Contractor. Salvage of useable Material shall be in accordance with Section 2-02.3(7)C.

2-02.3(4) ABANDON CATCH BASIN, VALVE CHAMBER, MANHOLE, OR INLET

As applicable to each structure designated on the Drawings to be abandoned, the Contractor shall remove the casting and debris; dewater; break down the structure to a depth of the cone sections, or 4 feet below the surface, whichever is greater, and plug the outlet pipe as specified in Section 2-02.3(5*)*; and fill the remaining structure and void with *Mineral Aggregate* or concrete as follows.

The Contractor shall not abandon any existing water service unless the Contract so specifies. When abandonment of an existing water service is required in the Contract, the Contractor shall first make the notification in Section 1-07.28 item 5.

Valve chambers, catch basins, and manholes shall be filled with *Mineral Aggregate* Type 9 or Type 17 or crushed concrete compacted to 95% of maximum dry density per Section 2-03.3(14)E. Old Type 164 inlets shall be filled with Class 5 (3/4) concrete (see Section 5-05.3). Inlet grates shall be delivered to the Owner.

The upper portion of abandoned structure shall be replaced with Material matching the existing Pavement Structure unless indicated otherwise in the Contract.

2-02.3(5) ABANDON AND FILL, AND PLUG PIPE

2-02.3(5)A ABANDON AND FILL PIPE

Pipes designated on the Drawings to be abandoned and filled shall be filled with a pumpable, flowable cement slurry completely filling the pipe (See section 9-05.23).

2-02.3(5)B PLUG PIPE

At each end of pipe designated on the Drawings as "abandon and fill" or "plug", the pipe end shall be completely plugged with Cement Concrete, Class 5 (3/4) (Section 5-05.3) for a minimum length of 12 inches with no voids.

2-02.3(6) SAWING AND LINE DRILLING

2-02.3(6)A REMOVAL

When saw cutting concrete pavement, driveway or sidewalk, with or without asphalt overlay, for removal, the minimum depth of sawcut shall be one-half and the maximum depth of sawcut shall be three-fourths of the concrete material.

For removal of pavements consisting of mortared decorative or other type special pavement units, such as brick or cobblestone or paver block, overlying a concrete pavement base (rigid pavement), the depth of saw cut shall be no more than three-fourths the thickness of the concrete base.

Curb removal shall be saw cut full height and width of curb.

Asphalt removal shall be saw cut full depth.

When line drilling, spacing of drilled holes center to center shall be 6 inches maximum and hole diameters shall be 1-1/2 inches minimum. Holes shall be perpendicular to the surface and shall penetrate completely through the pavement.

Saw cutting shall be the required method for the following removals:

1. When the Contract requires.
2. *When required by the permit for work in the Street Right –of –Way*.
3. *When the Engineer requires*.

To thoroughly clean sawcuts, the Contractor shall employ non-polluting methods either using, or as effective as using, high pressure water (water under at least 1400 psi.) to thoroughly flush the sawcuts of all debris and contaminants.

2-02.3(6)B PAVEMENT JOINTS

When sawcutting concrete pavement for contraction joints, as shown on Standard plan no. 405, the depth of sawcut shall be 1/3 the pavement depth and shall not cut tie bars and dowel bars (see Section 5-05.3(8)B2).

2-02.3(7) SALVAGE

2-02.3(7)A GENERAL

Unless otherwise indicated in the Contract, all materials identified as salvageable by the Engineer to be removed from the Project shall be carefully salvaged in its existing condition as amended in the following paragraph. Delivery of salvageable material shall be as specified in subsections 2-02.3(7)B through 2-02.3(7)F. Delivery of salvageable guardrail components shall be in accordance with Section 2-02.3(3)H. Materials deemed not salvageable by the Engineer shall be removed by the Contractor and disposed of.

All castings and other materials removed from the Project which are not to be re-used on the Project, and which in the opinion of the Engineer are suitable for salvage, shall have excess concrete, debris and dirt removed.

2-02.3(7)B WATER MAINS AND APPURTENANCES

The Contractor shall excavate and completely remove hydrants, valves, and any appurtenance where new Water Main and appurtenance is to be installed. Items designated for salvage will be indicated in the Contract with specific direction on who to contact, lead time advance notice, how to handle, and where to deliver. Removed Water Main and appurtenance shall be disposed of by the Contractor. Backfill shall be with Mineral Aggregate Type 17 and shall be compacted to meet the requirements of Section 7-17.3(3)B.

2-02.3(7)C *ILLUMINATION, SIGNALS, ELECTRICAL, AND SIGNS*

Electrical and *Traffic control* items to be salvaged shall include the following:

1. High pressure sodium luminaries, lamps and photo cells.
2. Aluminum bracket arms.
3. Aluminum lighting poles.
4. Wood and metal lighting poles.
5. Traffic poles, including joint lighting and traffic poles.
6. Mast arms.
7. Pedestals.
8. Traffic signal cabinets.
9. Signal heads.
10. Illuminated signs.
11. Handholes.
12. Junction and Terminal boxes.
13. Traffic signs - overhead.
14. Traffic sign.
15. *Signal appurtenances identified in the Contract*.
16. Miscellaneous channelization items.

Items 1 through 4 shall be delivered by the Contractor to City Light South Service Center at 4th Avenue South and South Spokane Street. Call 206-386-1766 prior to delivery of wood poles, or 206-386-1704 prior to delivery of metal poles, high pressure sodium luminaries, lamps, photo cells, and aluminum bracket arms.

Items 5 through 16 shall be returned to SEATRAN Traffic Shops at 4200 Airport Way South. Call 206-386-1206 a minimum 2 Working Days prior to delivery.

2-02.3(7)D REINSTALLING SALVAGED ELECTRICAL MATERIAL

See Section 8-30.3(4).

2-02.3(7)E GUTTER BRICK, PAVEMENT BRICK AND COBBLESTONE, AND GRANITE CURB

Unless the Contract specifies otherwise, the Contractor shall exercise reasonable care in the removal and salvage of existing gutter brick, pavement brick and cobblestone, and granite curb encountered during removal operations. The method of removal shall not damage the brick, cobblestone, or granite curb. If necessary, the Contractor shall hand excavate to ensure these materials are not damaged. The Contractor shall coordinate the loading operations with the SEATRAN Pavement Supervisor by giving at least 24 hours advance notice of the impending removal operations. Where removal takes place south of Denny Way, the Contractor shall call 206-386-1223. Where removal takes place north of Denny Way, the Contractor shall call 206-684-4660. See Section 8-14.3(8) for existing granite curb and new wheelchair ramps.

2-02.3(7)F DRAINAGE AND SEWER MATERIALS

Inlet, catch basin, manhole, and other Sewer and drainage materials, such as castings, grates, hoods, ladders, and related materials, deemed salvageable by the Engineer shall be delivered to the Haller Lake facility, weekdays between the hours of 8:00 AM and 3:00 PM. Contact 206-684-7507 at least 1 Working Day in advance for arrangement of delivery.

2-02.3(8) STREET SADDLES AND STEEL PLATES

2-02.3(8)A GENERAL

When excavations or other openings in the Right of Way cannot be completely backfilled at the end of the Day, street saddles or steel plates meeting the requirements that follow shall be used to temporarily cover the excavation or opening.

2-02.3(8)B STREET SADDLES

Saddle board shall be made of 4-inch roughcut, construction grade timbers with no warp. Saddle iron flanges shall be 6 inches wide x 8 inches long. They shall be made of 3/4-inch steel and have chamfered edges. The support iron shall be of adequate size so that there is no significant deflection with *Traffic*. At any time the saddle iron flanges do not get full bearing on the Roadway surface, shims shall be used. *Saddle boards and irons may be bolted together.*

Saddle irons and boards shall be firmly wedged on sides and ends. The boards shall be flush with the Roadway surface. All holes shall be cut to provide a good fit and without excessive openings. Saddle boards shall be notched to receive the irons, or scabbing shall be added to the sides of the board so that the board is flush along the pavement opening. *There shall be no more than 3 feet of unsupported board between irons. Saddle boards and irons shall be used only on those Streets which have concrete pavement or other surface which can safely support them.*

Asphalt shims, where needed, shall comply with the requirements of Section 2-02.3(8)C.

Street saddles in crosswalks and sidewalks shall have a non-skid surface coating.

2-02.3(8)C STEEL PLATES

Where a steel plate covers an excavation, each side of the steel plate bearing Steel plates shall have a minimum of 12 inches bearing on sides of a cut and shall be anchored by driving steel pins on all corners.

Flanges or angle irons shall be welded to the underside conforming basically to the size of the *Street* opening. Where the *Street* surface is uneven, plates shall be bedded on MC250 asphaltic mix.

Steel plates shall be capable of carrying a minimum of H 20 loading.

All steel plates shall have a tapered transition (shim) of cold asphalt mix placed against all vertical edges of the plate. The taper shall provide a smooth, gradual transition between pavement and plate of at least 12 inches to accommodate

wheelchairs and bicycles. The Engineer may require, in certain areas, that the tapered transition be highlighted with paint stripes. Paint stripes shall be Omaha Orange, approximately 2 inches wide and located on 16 inch centers.

Steel plates in crosswalks or sidewalks shall have a non-skid surface in both dry and wet conditions. Any crosswalk containing steel plates or saddles may be closed at the discretion of the Engineer.

2-02.4 MEASUREMENT

Bid items of Work completed pursuant to *the Contract* will be measured as provided in Section 1-09.1, Measurement of Quantities, unless otherwise provided for by individual measurement paragraphs *herein* this Section.

Measurement for saw cutting when required by the Contract will be made by the linear foot along the slope of the surface cut. No measurement will be taken for line drilling. Line drilling, and sawcutting not required by the Contract, will be considered incidental to the pavement removal Bid item.

Measurement for openings in Pavement Structure will be based on the removal and replacement limits indicated on Standard Plan no. 404 modified by the extended limits of restoration required to meet the "Street and Sidewalk Pavement Opening and Restoration Rules".

Abandon pipe will not be measured.

Measurement for "Abandon and Fill Pipe" will be by the actual number of linear feet of pipe abandoned and filled.

Measurement for "Remove Pavement Marking" and "Remove Pavement Marking, Thermoplastic" will be by the actual linear foot. Unpainted skips in pavement marking removal, and removal of traffic buttons and lane markers incidental to pavement marking removal, will not be measured.

Measurement for "Remove Pavement Marking Legend/Symbol" and "Remove Pavement Marking Legend/Symbol, Thermoplastic" will be measured per each.

Removal of monolithic curb and sidewalk will be considered sidewalk removal by the square yard and will be measured from the back of the walk to a point 6 inches from the face of the curb, and will be measured as curb removal per linear foot for that portion lying within 6 inches of the curb face.

Measurement for Mineral Aggregate Types will be in accordance with Section 4-01.4.

Measurement for "Abandon Existing Water Service" will be per each service permanently retired and disconnected from the existing Water Main.

2-02.5 PAYMENT

Compensation for the cost necessary to complete the work described in Section 2-02 will be made at the *Bid item prices* Bid only for the *Bid items* listed or referenced as follows:

1. "**Remove (Item)**", per square yard.
2. "**Remove (Item)**", per linear foot.
3. "**Remove (Item)**", per each.
4. "**Remove (Item)**", per lump sum.

The *Bid item price* for "Remove (Item)" shall include all costs for the work required to completely remove and dispose of or salvage the item as applicable.

Payment for removal of items not listed in the Bid Form and not specified in this Section shall be included in the Bid item prices of the various Bid items and no separate or additional payment will be made.

Removal of non-rigid pavement less than or equal to 6 inches in average thickness over granular base will be measured and paid as "Common Excavation" in accordance with Section 2-03, with the following exceptions:

a. *When excavating through non-rigid pavement averaging less than or equal to 6 inches in thickness over granular base to install underground facilities, the costs of removal of non-rigid pavement shall be considered as incidental to and included in the Bid item price of installing the new underground facility at no additional cost to the Owner. When excavating through non-rigid pavement greater than 6 inches in average thickness, the costs of removal of non-rigid pavement will be as specified in item b. immediately following.*

b. *Removal of non-rigid pavement over granular base on Street Improvement Projects will be paid as "Remove Pavement" if the average thickness of the pavement is greater than 6 inches.*

c. *When the Contract has amended the Standard Specifications to make removal of non-rigid pavement incidental to a particular Bid item as part of the Work, no separate or additional payment will be made.*

Removal of non-rigid pavement without removal of any underlying cement concrete base will be paid as "Remove Asphalt Overlay".

Costs for sidewalk thickened edge removal shall be incidental to and included in the remove sidewalk Bid item price.

When rigid base is to be removed, the removal of the asphalt overlay from edge of step-back to edge of step-back on each side of the trench shall be *considered included in the* Bid item price for "Remove Pavement".

Payment for removal of rigid pavement, whether as a rigid base or as a Surface Course, averaging greater than 4 inches will be paid as "Remove Pavement".

Payment for removal of rigid pavement, whether as a rigid base or as a Surface Course, averaging 4 inches or less will be paid as "Remove Cement Concrete Sidewalk".

Removal of trees within the limits of clearing and grubbing shall not be paid under a "Remove Tree" Bid item, *but will be paid* as specified in Section 2-01.5. *Removal of trees 6 inches or smaller in caliper measured 1 foot above the base of the trunk shall be considered incidental to and included in the Bid item prices for various Bid items comprising the Improvement.*

Payment for all minor utility devices such as meter boxes, handholes, inlets, sandboxes and pipe marked for removal in the Contract and which are located within the excavation area between pipe trench neat lines or within the neat line area of a structural excavation shown on the Drawings, shall be considered as incidental to and included in the Bid item price for installation of pipe or for structural excavation. Removal of catch basin and manhole will be paid for at the Bid item price Bid for their removal.

All costs for Class A curb removal will be paid as "Remove Curb". All costs for Class B curb removal shall be considered included in the Bid item prices for "Remove Pavement" and at no separate or additional cost to the Owner. See definitions for Class A and Class B curb removal in Section 2-02.3(3)E.

Removal of curb that is monolithic with sidewalk will be paid as "Remove Curb" and "Remove Sidewalk".

If there is no Bid item listed in the Bid Form for "Remove Traffic Buttons and Lane Markers", the cost shall be considered included in the various removal Bid items comprising the Work and shall be at no additional cost to the Owner.

Payment for removal of Traffic sign posts shall include all costs for the removal of the post, Traffic sign, mounting hardware and restoration of the surface where sign posts were removed.

The Bid item price for "Remove Pavement Marking", for "Remove Pavement Marking, Thermoplastic", for "Remove Pavement Marking Legend/Symbol", and for "Remove Pavement Marking Legend/Symbol, Thermoplastic" shall include all costs for the work required to remove and dispose of pavement marking including traffic buttons and lane markers. Pavement materially damaged by Contractor removal methods requiring restoration of the damaged pavement shall be at the sole expense of the Contractor and no separate or additional payment will be made therefore. No payment will be made for removal of pavement marking when the underlying pavement is removed.

The Bid item prices for "Remove Luminaire" and for "Remove Luminaire and Bracket Arm" shall include all costs for the work required to remove the existing luminaire, or luminaire and bracket arm and its ballast, wiring and appurtenances.

The Bid item price for "Remove Pole, Metal" shall include all costs for the work required to remove and salvage the pole.

The Bid item price for "Remove Pole, Wood" shall include all costs for the work required to remove and salvage the pole, and to backfill and compact the void left after pole removal.

The Bid item price for "Remove Foundation, (Type)" shall include all costs for the work required to remove and dispose of the foundation, and to backfill and compact the void left after removing the foundation.

5. "**Saw Concrete, 2 Inch Minimum Depth**", per linear foot.
6. "**Saw Asphalt, Full Depth**", per linear foot.

The Bid item price for sawcutting shall include all costs for the work required to saw cut concrete or asphalt only at the locations indicated or specified in the Contract. No payment will be made for sawcutting concrete or asphalt which is done at the option of the Contractor and is not indicated in the Contract.

In sawcutting of the rigid base, sawcutting through the asphalt overlay will not be measured as a separate item of Work and shall be included in the *Bid item price* of the Bid item "Saw Concrete, 2 Inch Minimum Depth".

When the Contract or the Engineer requires sawcutting for neat edge removal of the asphalt overlay step-back, all costs for the sawcutting will be paid in accordance with the Bid item "Saw Asphalt, Full Depth".

7. "**Abandon (Item)**", per each.

The Bid item price for "Abandon (Item)" shall include all costs for the work required to abandon the specified item.

8. "**Abandon and Fill Pipe**", per linear foot.

The Bid item price for "Abandon and Fill Pipe", shall include all costs for the work required to plug the pipe where indicated on the Drawings and furnish and fill the pipe with cement slurry.

No payment will be made to abandon pipe or other subsurface items identified on the Drawings and for which no work is required. Plugging the exposed or open ends of pipes to be abandoned shall be considered incidental to and included in the Bid item price for the installation of new pipe and at no additional or separate cost to the Owner.

9. "**Remove Signalization (Location)**", per lump sum.

The Bid item price for "Remove Signalization (Location)" shall include all costs for the work required to complete the removal, disposal, and salvage work as specified in the Contract including salvaging, stockpiling and delivering Equipment as determined by the Engineer and disposal of removed items not salvaged.

10. **Other payment information**

When existing Type 164 Inlet (see Std. Plan 268) is to be removed with the removal of concrete pavement, the removal of the inlet shall be considered incidental to the cost of "Remove Pavement".

Removal of asphalt traffic islands, either over pavement or over granular Material, will be paid as "Common Excavation" and shall include removal of asphalt, granular Material under asphalt, and precast curbs around the island.

All costs for coordination and delivery of salvageable material shall be included in the various Bid item prices.

All costs for disposal shall be included in the various Bid item prices for the Work.

SECTION 2-03 ROADWAY EXCAVATION AND EMBANKMENT

2-03.1 DESCRIPTION

2-03.1(1) GENERAL

Section 2-03 describes work consisting of excavating and grading the Roadway; excavating below grade; removing and replacing slide material; furnishing, placing, temporarily stockpiling, and compacting selected or other backfill Material; removing and disposing of unsuitable or excess material; and all work necessary for the construction and completion of cuts, embankments, slopes, Roadway ditches, side *Street* approaches, *Alley* and *Alley* approaches, driveways and driveway approaches, sidewalks and planting areas, and such subsidiary work not otherwise provided for separately in other Sections of the *Standard* Specifications.

This work shall be performed in reasonably close conformity with the lines, grades, and cross sections indicated in the Contract or established by the Engineer.

2-03.1(2) CLASSIFICATION

Roadway excavation shall be classified as common excavation, solid rock excavation and unsuitable foundation excavation. Trench excavation shall be as specified elsewhere.

Solid Rock Excavation shall consist of the removal and disposal of solid rock, i.e. ledge rock that requires systematic drilling and blasting for its removal and also boulders exceeding 1/2 cubic yard in volume as determined by the Engineer. Hard pan, hard clay or glacial till shall not be classified as solid rock excavation. Sandstone, siltstone, shale or other sedimentary rocks which are soft, weathered or extensively fissured shall not be classified as solid rock excavation. *Soft rock is defined as an earth material that has a modulus of elasticity of less than 200,000 psi*.

Unsuitable Foundation Excavation shall consist of the removal and disposal of unstable material including, but not limited to, peat, muck, swampy or other unsuitable materials such as buried logs and stumps, but only when the removal is as specified in Section 2-03.3(14)F or Section 2-03.3(14)G and such methods are specified in the *Contract* and included in the Bid Form or are specifically ordered in writing by the Engineer. Removal of soft or spongy spots in the prepared Subgrade shall be considered excavation below grade pursuant to Section 2-03.3(3).

Common Excavation shall consist of all other material not classified as solid rock excavation, unsuitable foundation material excavation, or excavation which is considered to be incidental to other Bid items identified in other parts of the Contract. The widening of Roadway cuts and ditches, and excavation below the designated Subgrade elevation to an excavation depth of 3 feet or less below Subgrade elevation when ordered by the Engineer, shall be considered as common excavation.

2-03.1(3) PROTECTION OF EXISTING IMPROVEMENTS

The Contractor shall insure that stockpiled Mineral Aggregates, that debris from the Work area, and that materials from Roadway excavation are prevented from entering existing drainage structures and water courses as required in Sections 1-07.5 and 1-07.15 and shall be removed as required in Section 1-04.11.

2-03.2 RESERVED

2-03.3 CONSTRUCTION REQUIREMENTS

2-03.3(1) WIDENING OF CUTS

If routine cuts do not supply enough Material to form the embankment, the Contractor shall obtain more fill from cuts inside or outside the Right of Way as the Engineer may direct or from widening one or both sides of existing cuts as staked by the Engineer.

In either case, the Contractor shall dress the sides of the cuts to any slopes the Engineer may require.

2-03.3(2) ROCK CUTS

2-03.3(2)A PRESERVING ROCK BELOW SUBGRADE

The Contractor shall take care not to break down, loosen, or damage the rock under the Subgrade line except as provided by Section 2-03.3(3). Normally, cuts shall be made from the top, lift by lift, to protect the rock bench that remains. The Contractor shall be responsible for methods used and for any damage caused to the Roadbed, regardless of any previous approvals by the Engineer.

2-03.3(2)B SCALING AND DRESSING

To leave rock cuts in a safe, stable condition, the Contractor shall scale and dress them, removing all loose fragments and rocks not firmly fastened to the rock slope. The Contractor shall also remove any overhanging rock the Engineer sees as a hazard to Roadway users.

If the Engineer requires it, the Contractor shall remove loose fragments and rocks lying outside the slope stakes including loading and hauling. Such extra work shall be as provided in Section 1-04.4.

2-03.3(3) EXCAVATION BELOW GRADE

When the Contractor finds rock or other hard Material at the Subgrade elevation, it shall be excavated the full width of the Roadbed to at least 6 inches below Subgrade, then backfilled with rock fragments, gravel, or other free-draining Material not more than 4 inches in diameter.

If the Contractor uses a Subgrade trimmer, the backfill shall be rock, gravel, or other free- draining Material not more than 2 inches in diameter. The Contractor shall save the finer granular Material from excavations or borrow pits to use in backfilling the top 6 inches of the Subgrade. All such Material shall be approved by the Engineer.

Draining rock pockets. If blasting below Subgrade leaves a rock pocket that does not drain, the Contractor shall at *no additional cost to the Owner*, dig a trench from the pocket bottom to the roadside ditch, then backfill both the pocket and the trench with rock fragments, gravel, or other Material approved by the Engineer.

Compaction. If the density of the natural earth under any area of the Roadway is less than that required in Section 2-03.3(14)D, Method B, the Engineer may direct the Contractor to:

1. Scarify the earth to a depth of 6 inches.
2. Aerate or water.
3. Compact the scarified area to the required density.
4. Excavate to a specific depth.
5. Backfill the excavated area in layers, using the previously excavated Material or other Material.
6. Compact each layer to meet the compaction requirements for embankments.

2-03.3(4) SLUICING

The Contractor shall not excavate by sluicing unless the Contract specifically calls for it.

2-03.3(5) SLOPE TREATMENT

The tops of all Roadway cut slopes, except solid rock cuts, shall be rounded in accordance with Standard Plan no. 140. Unless otherwise noted in *the Contract*, Class A slope (Class A slope refers to WSDOT Standard H-8 treatment) shall be utilized.

If a layer of earth covers a rock cut, the slope shall be rounded above the rock as if it were an earth slope.

When the Contractor removes stumps or any embedded Material from the rounded area, the void shall be backfilled and stabilized to prevent erosion.

2-03.3(6) DEPOSIT OF ROCK FOR OWNER'S USE

At the Engineer's direction, the Contractor shall deposit excavated rock at the roadside or elsewhere. If this requires the Contractor to use Material that would otherwise have gone into an embankment, the Owner will pay for the extra cubic yards of excavation needed to complete the embankment. Any such rock deposit shall be Owner property. The Contractor shall be responsible for safe-keeping the deposit until the Owner has removed it or until the Contract is completed.

2-03.3(7) DISPOSAL OF SURPLUS MATERIAL

Material obtained from all excavation within the *Project Site* shall not be wasted unless the excavated material is designated by the Engineer as unsuitable for use in embankment construction, trench backfill, or for other purposes.

Disposition of surplus material from trench excavation shall be as specified in Section 2-03.3(10). Wetlands are defined as those areas inundated or saturated by ground or surface water at a frequency and duration sufficient to support, and, under normal circumstances, do support a prevalence of vegetation typically adapted to life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.

Material which is surplus to the needs of the Project or determined to be unsuitable by the Engineer shall be disposed of in accordance with the requirements noted herein and in Section 2-01.2.

The Contractor shall acquire all permits and approvals required for the use of the disposal site.

The Contractor shall, if requested by the Engineer, provide the Engineer the location of all disposal sites to be used and also provide copies of the permits and approvals for such disposal sites.

Disposal of excess material within a wetland area will not be allowed without a Section 404 permit issued by the U.S. Corps of Engineers and approval by the local agency with jurisdiction over the wetland. Wetlands are defined as those areas inundated or saturated by ground or surface water at a frequency and duration sufficient to support, and that under normal circumstance do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.

Any action required to satisfy any permit and/or any approval requirements in a Contractor-provided disposal site shall be performed by the Contractor at no additional *cost to the Owner*.

Reclamation of a Contractor-supplied Waste site *shall* conform to the requirements of Section 3-03.

2-03.3(8) WASTING MATERIAL

If the Contractor wastes excavated material which is deemed suitable by the Engineer for embankment or other backfill work, and Material is later needed for embankment or backfill work, the Contractor shall, *at no cost to the Owner*, replace the wasted material with Material meeting the Engineer's approval.

2-03.3(9) ROADWAY DITCHES

At each transition from cut to embankment fill, the Contractor shall divert any Roadway ditch away from the embankment in natural ground. Ditches shall never permit water to flow into or upon embankment Material.

All ditches shall be constructed as shown on the Drawings and shall be graded to direct the flow of the water to catch basins, Culverts or channels.

2-03.3(10) SELECTED MATERIAL

Selected Material shall be considered as that Material designated by the Engineer as suitable for selected fill applications which is obtained from the excavation or widening of the Roadway prisms, or any other excavation within the Right of Way, including trench excavation. Selected Material shall be used first before new borrow Material is imported for construction of Project embankments, finishing the top portion of the Subgrade, structure backfill, or such other backfill applications the *Contract* may designate.

Selected Material shall be used for any of the following purposes as determined by the Engineer:

1. Embankment construction.
2. In lieu of *Mineral Aggregate* (Type) meeting the requirements of Section 9-03.
3. Trench backfill.
4. Planting soil.
5. *Other selected uses*.

Excavated material which is in excess of the needs of the Project shall be disposed of per Section 2-01.2.

Selected Material shall be placed and compacted in accordance with the requirements for the type of *work* for which the Material is being used.

Unless the Contract specifies otherwise, the Engineer may identify as "selected" any Material excavated within the Right of Way, including the excavation of local borrow. Where the Contract specifies Material excavated from the Project Site to be labeled as top soil Type B, additional qualifications can be found in Section 8-01.3(2)C.

If necessary, stockpiling of selected Material shall be at locations approved by the Engineer. Thereafter, such Material shall be removed from stockpile and used when needed. Excavated Material stockpiled for use as selected materials shall be protected from contamination by other materials and from damage by weather by covering with waterproof sheeting or such other means as the Contractor deems necessary. Materials stockpiled and later found unsuitable by the Engineer shall be disposed of and replaced with Material acceptable to the Engineer.

2-03.3(11) SLIDES

The Contractor shall slope the sides of cuts and embankments to comply with lines staked or reestablished by the Engineer. If a slide occurs on a finished slope before final acceptance of the Work, the Contractor shall remove or replace the slide Material. The Contractor shall also refinish the slope to the condition and with the Materials required by the Engineer.

If the Contractor undercuts or destroys a slope, the slope shall be resloped to the original alignment or to a new one established by the Engineer at the sole expense of the Contractor.

2-03.3(12) OVERBREAK

Overbreak includes that part of any material excavated, displaced, or loosened outside the staked or reestablished slope or grade. Such material is considered overbreak whether its movement resulted from blasting, from the character of the material itself, or from any other cause. Overbreak, however, does not include material from slides as described in Section 2-03.3(11).

If the Engineer does not approve use of the overbreak, the Contractor shall remove, haul, and dispose of it, at no expense to the Owner. In this case, the Contractor shall follow the procedure for handling surplus Material described in Section 2-03.3(7).

If the Engineer approves, the Contractor may use overbreak:

1. To complete an embankment when the excavated material unexpectedly falls short of the amount required.
2. To replace borrow excavation originally planned for an embankment.

2-03.3(13) BORROW

Borrow is imported Material obtained from sources other than the Roadway prism, trench excavation, or other excavation on the Project. When suitable native excavated Material is insufficient, borrow shall be used to construct embankments, Subgrade, Shoulders, other Roadway components to the neat lines shown on the Drawings. Sources of borrow Material shall be approved by the Engineer.

Borrow shall be classified as "Unclassified Borrow" or "Borrow (Type)" as follows:

.1. Unclassified Borrow shall be an imported soil which meets the suitability requirements set forth in Section 2-03.3(14).

2. Borrow (Type) shall be an imported soil which meets the suitability requirements set forth in Section 2-03.3(14) and in addition, meets all gradation and other requirements listed in Section 9-03.16 for the Mineral Aggregate *Type* specified (e.g., "Borrow, *Mineral Aggregate* Type 17", etc.).

2-03.3(14) EMBANKMENT CONSTRUCTION

2-03.3(14)A GENERAL

The Owner classifies embankment construction as:

1. **Rock embankment** - in which the Material in all or any part of an embankment contains 25 percent or more, by volume, gravel or stone 4 inches or more in diameter. Section 2-03.3(14)B.
2. **Earth Embankment** - made of any Material other than that used in rock embankment. Section 2-03.3(14)C.
3. **Unstable Base -** If the Engineer believes the natural earth base impairs an embankment or makes it unstable, the Contractor shall stabilize or remove and dispose of the base Material in keeping with this Section or Sections 2-03.3(14)F.

4. **Hillside Terraces -** *Unless the Contract specifies otherwise*, the Contractor shall terrace the original ground or embankment on hillsides, on the sides of existing embankments and in transitions from cuts to fills. Each terrace shall penetrate the slope at least 5 feet and shall not be more than 5 feet high. The horizontal face of the terrace shall slope outward at approximately 0.05 foot per foot. The Engineer may order the Contractor to place gravel backfill, pipe drains or both to drain any seepage.
5. **Soft Base -** On wet or swampy ground, the Contractor shall haul and spread embankment Material by methods that cause minimal disturbance to the base. If the Engineer approves, the Contractor may place the lower part of the fill by dumping and spreading successive loads to form a uniform layer just thick enough to support Equipment used to place and compact upper layers.

Normally the Contractor shall not increase the planned depth of the embankment over a soft base merely to permit the use of heavier Equipment. However, if the Contractor can demonstrate that the planned depth can not support light hauling vehicles, the Engineer may approve a deeper fill. The Contractor shall not claim extra pay if these restrictions require the use of light Equipment or different construction methods than originally planned for use on the soft base.

In the order of priority, Material used for embankment shall be:

1. Selected Material obtained from Common Excavation and Trench Excavation; and
2. Borrow of the type specified.

Selected excavated Material shall be used to construct of all required Project embankments per Section 2-03.3(10).

Excavated Material will be considered suitable for general fill applications which do not require a Material meeting specific Mineral Aggregate Type Specifications found in Section 9-03 if it:

1. Is capable of attaining the degree of compaction specified in Section 2-03.3(14)D;
2. Is within ±3 percent of optimum moisture content as determined in accordance with ASTM D 698;
3. Is free from deleterious Material and does not contain more the 5% total by volume of organic Material; clay; frozen lumps; and rocks, concrete, asphalt, or other debris and rubble having a dimension greater than 6 inches.

Embankment Material that contains less moisture than required for proper compaction with the compacting Equipment being used shall be watered to obtain the optimum range of moisture. Compaction of embankment Material that contains excessive moisture shall not be started until the moisture content is reduced to the optimum range of moisture.

2-03.3(14)B ROCK EMBANKMENT CONSTRUCTION

The Contractor shall build rock embankments in horizontal layers. No layer shall be deeper than 18 inches unless the rocks in the fill Material average more than 18 inches in diameter. The Contractor shall separate and distribute the larger pieces of rock and fill the spaces between them with smaller rocks and earth. With the Engineer's approval, the Contractor may dispose of rocks larger than the average size instead of placing them in the embankment.

Compacting. The Contractor shall use a 50-ton compression roller or a vibratory roller having a dynamic force of at least 40,000 pounds impact per vibration and at least 1,000 vibrations per minute. In either case, the roller shall make one full coverage for each 6 inch lift depth, or any fraction of 6 inch lift depth.

When the lift depth is 18 inches or less, the Contractor may use a 10-ton compression roller or a vibratory roller having a dynamic force of at least 30,000 pounds impact per vibration and at least 1,000 vibrations per minute. In either case, the roller shall make four full coverages for each 6 inches of lift depth, or any fraction of 6 inch lift depth.

Rollers *shall* exert reasonably even pressure over the area covered. The Contractor shall limit the speed of compression rollers to no more than 4 miles per hour, and the speed of vibratory rollers to no more than 1.5 miles per hour.

If possible, the Contractor shall compact the Material even further by routing empty and loaded hauling Equipment evenly over the entire width of the embankment.

When the Engineer believes rolling to be physically impractical, rolling may be omitted on part or all of a layer.

Should excessive moisture threaten the stability of the embankment, the Engineer may order the Contractor to alter the operation. *The Contractor may alternate layers of wet and dry Materials, drying Materials before placing, or halting Work in the problem areas*.

Top layer. The Contractor shall build each rock embankment up to 6 inches below Subgrade. *The top 6-inch layer of embankment shall be of rock, gravel, or other free-draining material that does not exceed 4 inches in any dimension. When the Contract requires use of a Subgrade trimmer, these Materials in the top layer may not exceed 2 inches in diameter.*

When practical, and as approved by the Engineer, the Contractor shall save the finer granular Material from excavations or borrow pits for use in topping rock fills.

2-03.3(14)C EARTH EMBANKMENT CONSTRUCTION

The Contractor shall place earth embankments in horizontal layers of uniform thickness. These layers shall run full width from the top to the bottom of the embankment. Slopes shall be compacted to the required density as part of embankment compaction.

During grading operations, the Contractor shall shape the surfaces of embankments and excavations to uniform cross-sections and eliminate all ruts and low places that could hold water.

On a tangent, the Contractor shall raise the center of the embankment above the sides. On a sidehill, the high point of any layer shall intersect the original ground and shall slope uniformly toward the lower side. This slope shall not exceed 1 foot in 20 feet.

2-03.3(14)D COMPACTING EARTH EMBANKMENTS

This section describes three methods (A, B, and C) for building earth embankments. The Contractor shall use Method B unless the Contract requires another method.

Method A. Each embankment shall be made of layers no more than 2 feet thick. The Contractor shall compact each layer by routing loaded haul Equipment over its entire width. If the Engineer approves, the Contractor may use end dumping to begin placing a sidehill fill too narrow for hauling Equipment. When the fill is wide enough, the remaining layers shall be compacted by the loaded hauling Equipment.

Method B. The top 2 feet of each embankment shall be compacted to 95 percent of the maximum density as determined by the compaction control tests described in Section 2-03.3(14)E. All Material below the 2-foot level shall be compacted to 90 percent of the same maximum density.

In the top 2 feet, horizontal layers shall not exceed 4 inches in depth before compaction. No layer below the top 2 feet shall exceed 8 inches in depth before compaction.

The Contractor shall use compacting Equipment approved by the Engineer.

Method C. Each layer of the entire embankment shall be compacted to 95 percent of the maximum density as determined by the compaction control tests described in Section 2-03.3(14)E.

In the top 2 feet, horizontal layers shall not exceed 4 inches in depth before compaction. No layer below the top 2 feet shall exceed 8 inches in depth before compaction.

The Contractor shall use compacting Equipment approved by the Engineer.

Under Methods B or C, the Engineer may permit the Contractor to increase layer thickness up to 18 inches before compaction, provided:

1. The layer is more than 2 feet below the top of the embankment,
2. An approved vibratory roller is used, and
3. The required density is obtained throughout the full depth and width of each layer.

Whatever the method used, any embankment inaccessible to large compacting Equipment shall be compacted with small mechanical or vibratory compactors.

Moisture content. Within the limits described in the following, the Contractor shall adjust moisture content during compaction to produce a firm, stable embankment. The Contractor shall not begin compaction until the moisture content is so adjusted.

Under Method B, the moisture content of the Material shall not exceed 3 percent above the optimum determined by the tests described in Section 2-03.3(14)E. *If the Material contains too little moisture to compact properly, the Engineer may order the Contractor to water the Material to achieve the range of optimum moisture. See Section 2-07 regarding water.*

Under Method C, the moisture content shall not vary more than 3 percent above or more than 3% below optimum determined by the tests described in Section 2-03.3(14)E.

The Engineer may permit the Contractor to place Materials having a higher moisture content than specified in this Section if:

1. The Material consists of free-draining rock, gravel, or sand that produces a firm, stable embankment, and
2. The excess moisture does not result in impairing the embankment.

However, the Engineer may at any time require the Contractor to return to normal moisture-content Specifications.

The Owner will consider all costs of drying embankment Material to be incidental to other Work and at no additional cost to the Owner. If, however, the Contract includes an aeration Bid item of Work, the Owner will measure for such Bid item of Work as specified in Sections 2-03.4 and pay as specified in Section 2-03.5.

If weather prevents drying excavation or borrow Materials to the required moisture content, the Engineer may order the Contractor to alter normal procedures or Equipment to prevent damage to the partial or complete embankment.

The Contractor shall repair any partial or complete embankment that loses stability because of continued hauling across it. Evidence of lost stability shall include pumping or rutting. The Contractor shall also alter hauling Equipment or procedures to prevent further damage.

If it appears that rain or snow is likely to soak an area that has been aerated, the Contractor shall temporarily seal it against the weather. Should the Contractor fail to do so, any additional aeration required to restore the area to its previous condition shall be done at no expense to the Owner.

2-03.3(14)E COMPACTION CONTROL TESTS

In-place density, or field soil density reading, will be determined by one or more of the following methods:

1. ASTM D 1556, Test for Density of Soil In-place by the sand cone method.
2. ASTM D 2167, Test for Density of Soil In-place by the rubber balloon method.
3. ASTM D 2922, Test for Density of Soil In-place by the nuclear method.

The Contractor shall provide the Engineer a minimum 1 Working Day advance notification when field soil or Mineral Aggregate density reading or compaction testing is required.

Laboratory densities may be determined by one of the following methods:

1. ASTM D 698, Moisture-Density Relations of Soils and Soil-Aggregate Mixtures.
2. ASTM D 4253, Maximum Index Density of Soils using a Vibratory Table.

3. ASTM D 1557, Laboratory Compaction Characteristics of Soil Using Modified Effort.

ASTM D 698 will be used for computing the maximum density of all fill soils except for those granular soils yielding, in the opinion of the Engineer, an unsatisfactory moisture-density curve. In that case the maximum density will be determined by the method specified in ASTM D 4253. *Compaction to ASTM D 1557 standards will only be used when so specified in the Contract.*

The Contractor shall excavate pits for density sampling at locations designated by the Engineer. Density sampling will be performed by Owner forces.

Degree of compaction in trench backfill shall be as specified in Section 7-17.3(3)B. All other fills and earth embankments shall be compacted as specified in Section 2-03.3(14)D.

2-03.3(14)F UNSUITABLE FOUNDATION EXCAVATION

When the Contract or the Engineer requires it, the Contractor shall excavate unstable natural ground before building any embankment over it. This unstable material may include peat, muck, swampland, buried logs and stumps, or other material not fit for an embankment base. The Contractor shall excavate such material to the boundaries set by the Engineer.

The work will not be considered unsuitable foundation excavation if the materials:

1. Came from the Roadway cut, ditch, or channel-change prisms as defined by Section 2-03.1(2).
2. Resulted from structure excavation.
3. Are covered in Section 2-03.3(3).

Materials excavated from the Roadway or channel change prisms will not be classified as unsuitable foundation excavation as defined by Section 2-03.1(2) unless the removal is accomplished by dragline operation or by special excavation methods requiring different Equipment from that used for Roadway excavation, as determined by the Engineer.

2-03.3(14)G DISPLACEMENT OF UNSUITABLE FOUNDATION MATERIALS

If the Contract requires it, the Contractor shall displace or remove any overburden of peat, muck, or other unstable material to permit placing the embankment on underlying firm ground. The Engineer will determine the elevation at which the ground is firm enough to support the embankment.

To displace such material, the Contractor shall use methods the Engineer requires. If this work upheaves overburden material outside the slopes of the new fill, the Contractor shall level the Material to make it presentable or to make final grade.

2-03.3(14)H BACKFILLING

When water fills an area after the removal of soft or unstable materials, the Contractor shall, if possible, drain the site so that backfill can be compacted. If drainage is not possible, the Contractor shall use granular Material for backfilling in water, including areas where blasting has displaced the soft material. The Contract may require other backfilling methods.

2-03.3(14)I PREFABRICATED VERTICAL DRAINS

If the Contract requires it, the Contractor shall install prefabricated vertical drains and a sand drainage blanket to stabilize the soft or unstable Material that overlays firm ground as indicated in the Contract.

The prefabricated drain shall consist of a continuous plastic drainage core wrapped in a non-woven geotextile Material as specified in the Contract.

The drains shall be free of defects, rips, holes, or flaws. During shipment and storage, the drain shall be wrapped in a heavy duty protective covering. The storage area shall protect the drain Material from sunlight, mud, dirt, dust, debris, and detrimental substances. *A Manufacturer's Certificate of Compliance shall be provided for all drain Materials delivered to the Project Site.*

Vertical drains shall be staked by the Contractor and constructed prior to embankment construction.

Prior to installation of vertical drains, a sand drainage blanket shall be placed on the ground surface for use as a working platform. This platform shall have a minimum depth of 2 feet and shall consist of uncompacted Material meeting the requirements of Section 9-03.13(2).

Vertical drains shall be installed with Equipment which cause a minimum of subsoil disturbance. A mandrel or sleeve shall be advanced through the subsoil using vibratory, constant load, or constant rate of advance methods. The mandrel shall have a maximum cross-sectional area of 14 square inches, shall protect the prefabricated drain Material from tears, cuts, and abrasions during installation, and shall be provided with an “anchor” plate or rod. The “anchor” plate or rod shall provide sufficient strength to prevent the soil from entering the bottom during installation and shall anchor the bottom of the drain at the required depth when the mandrel is removed. Use of falling weight impact hammers or jetting will not be allowed within the compressible subsoil to be drained.

The prefabricated drains shall be installed vertically from the working surface to the required elevations and in a sequence that do not require Equipment to travel over previously installed drains. The Contractor shall provide the Engineer with a suitable means of verifying the Equipment is plumb, and determining the depth of the drain at any time. The Equipment shall not deviate more than 0.25 inch per foot from plumb.

Splices or connections in the prefabricated drain Material shall be done in a professional manner to ensure continuity of the wick Material. The prefabricated drain shall be cut to leave at least 6 inches protruding above the working platform at each drain location.

Where obstructions are encountered which cannot be penetrated, the Contractor shall abandon the hole. A maximum of two attempts shall be made to install a new drain within 18 inches of the obstructed hole. *If the following two*

attempts also encounter an obstruction, the Contractor shall promptly notify the Engineer. Drains that otherwise deviate from the Drawing location by more than 6 inches, or that are damaged or improperly installed, will be rejected.

Installation of the drains should consider and be coordinated with the geotechnical instrumentation shown on the Drawings. Special care shall be taken when installing drains near instrumentation already in place. Replacement of instrumentation damaged by the Contractor shall be the responsibility of the Contractor.

The Contractor shall demonstrate that the Equipment, method, and Materials produce an acceptable installation in accordance with these Specifications. For this purpose, the Contractor will be required to install trial drains at Engineer designated locations within the Work area.

At least 2 weeks prior to the installation of the drainage wicks, the Contractor shall submit to the Engineer, for review and approval, details of the sequence and method of installation. The submittal shall, at a minimum, contain the dimensions and length of mandrel, a detailed description of the proposed method(s) for overcoming obstructions, and the proposed method(s) for splicing drains.

Approval by the Engineer does not relieve the Contractor of the responsibility to install prefabricated vertical drains in accordance with the *Contract*. If, at any time, the Engineer considers the method of installation does not produce an *acceptable* drain, the Contractor shall alter the method and Equipment as necessary.

2-03.3(14)J EMBANKMENTS AT BRIDGE AND TRESTLE ENDS

This work consists of filling around the ends of trestles and bridges, the area defined in Section 1-01.3 as Bridge Approach Embankment. The Contractor shall begin and complete this work as soon as possible after each bridge is completed or when the Engineer requires.

The Contractor shall select fill Material from the excavation sources elsewhere on the Project. Bridge Approach Embankments shall be compacted to at least 95 percent of the maximum density as determined by the tests described in Section 2-03.3(14)E. In any embankment area where piles are to be installed, the Contractor shall remove all solid material, rocks, broken concrete, etc., larger than 3 inches across that would interfere with pile driving.

To prevent the bridge from being distorted or displaced, the Contractor shall place Material evenly around all sides and parts of the Structure. The Contractor shall not backfill any abutment prior to placing the Superstructure. After the Superstructure is in place, small compactors may be required. Embankments *shall* be layered and compacted concurrently at either end of the Structure. The difference in embankment height from one end to the other *shall not* exceed 2 feet.

The Contractor shall build the embankment under the bridge to the dimensions shown in WSDOT Standard Plan no. H-9 unless detailed otherwise in the Contract.

2-03.3(14)K GRAVEL BORROW INCLUDING HAUL

When the Contract requires, the Contractor shall use gravel borrow meeting the requirements of Section 9-03.14 to:

1. Build embankments.
2. Backfill excavation of unsuitable foundation material.
3. Backfill below-grade excavation.

2-03.3(15) AERATION

The Contractor shall use methods known to be effective in building embankments with wet Materials. Such methods include open ditching to drain excavation areas or alternating layers of wet and dry Materials.

Aeration Equipment. The Engineer may direct the Contractor to use aeration Equipment in Roadway excavation, borrow sites, or embankments. The Owner does not guarantee the moisture-reducing effectiveness of any single type of Equipment. The Engineer may, however, require the use of any type Equipment believed to be the best to aerate a given area.

If the Contractor uses any of the following types of Equipment, it shall meet these minimum requirements:

Heavy duty power grader. This machine shall have a moldboard measuring 12 feet long, 24 inches high, and 3/4 inch thick. Each grader shall carry its maximum number of standard scarifier-rippers or discs.

Heavy duty gang plow. It shall have at least five 16-inch bottoms. Its tractor shall be able to move no less than 1-1/2 miles per hour while plowing at least 9 inches deep through fairly wet material.

Heavy duty tandem discs. This machine shall cut a swath at least 8 feet wide with discs no less than 28 inches in diameter. Its tractor shall be able to turn fairly wet material at least 6 inches deep while moving at 2 miles per hour or more.

Heavy duty self-propelled, rotary pulverizer. This machine shall have paddles attached to a transverse shaft. It shall travel 1-1/2 miles per hour or more while aerating a swath at least 6 feet wide to a depth of 6 inches.

The Contractor shall not use any aerating Equipment listed above in tandem nor use any of this Equipment to carry out other Bid items of Work while aerating.

The Engineer may halt aerating work when weather conditions prevent acceptable results.

2-03.3(16) END SLOPES

The Engineer will determine when and where to build end slopes, whether these occur at the beginning or end of a Project, at the borders of excavation or embankments, at bridge ends, or elsewhere. The Contractor shall build end slopes not detailed on the Drawings to the line and grade staked by the Engineer regardless of center line limits shown on the Drawings. All work to complete and maintain these end slopes shall be considered as work to be performed under the Contract.

2-03.3(17) SNOW REMOVAL

If snow is deep enough to interfere with the work that covers a cut or an embankment, *the Contractor shall remove snow to outside the slope stakes*. Snow removal *shall* be done at least 100 feet ahead of excavation and embankment work.

2-03.3(18) STEPPED SLOPE CONSTRUCTION

W*hen indicated on the Drawings, the Contractor shall shape slopes cut in soft rock to a stepped pattern conforming closely to the typical cross-section shown on the Drawings.* Stepped slopes shall meet these requirements:

1. Each step shall be 1 to 2 feet high.
2. The horizontal depth of each step depends on its relationship to the staked slope ratio. The approximate midpoint of each horizontal tread shall occur on the staked slope line.
3. The treads shall be approximately level in all directions.
4. The ends of the steps shall be blended into the natural ground, with loose Material removed from transitional areas.
5. If the Contractor cannot rip a rock outcropping within a cut, the steps shall be blended into the rock.
6. Large rocks and Material that may fall into the ditch line or onto the Roadway shall be removed, but scaling is not required.

The compaction for seeding requirements of Section 8-01.3(1)B shall not apply to stepped slope construction.

2-03.4 MEASUREMENT

Bid items of Work completed pursuant to *the Contract* will be measured as provided in Section 1-09.1, Measurement of Quantities, unless otherwise provided for by individual measurement paragraphs *herein* this Section.

Excavation of the class specified will be measured by the cubic yard in its original position by cross sectioning or through the use of digital terrain-modeling techniques. Quantities will be computed to the neat lines of the cross sections as staked or thereafter modified by the Engineer, except where such modification is the result of excavating beyond the limits established to remove and replace Roadway Material which has become unsuitable because of the Contractor's neglect, negligence or method of operation.

Borrow will be measured by the ton at the point of delivery in accordance with Section 1-09.1.

Unsuitable foundation excavation will be measured by the cubic yard in its original position by cross sectioning.

Prefabricated vertical drains will be measured by the vertical foot from the top of the working table to the bottom of the holes.

Sand borrow for drainage blanket will be measured by the cubic yard or by the ton as indicated *in the Bid Form*, provided that moisture in excess of 8 percent will be deducted in ascertaining the pay quantities when measured by the ton.

Embankment compaction will be measured by the cubic yard of embankment Material compacted pursuant to Section 2-03.3(14)B, or pursuant to Method B or Method C in Section 2-03.3(14)D. Quantities will be computed based upon measurements taken to the neat lines of the staked cross section and no allowance will be made for settlement.

When existing Material in a cut section is stabilized by scarifying, aerating and compacting, measurement for the embankment compaction will be based upon the length and width of cut section compacted and a maximum depth of 6 inches.

Measurement for depth of common excavation will be as specified in Section 2-03.1(2).

Measurement for stepped slope excavation will be by the cubic yard as defined by the staked slope line and the existing slope.

2-03.5 PAYMENT

Compensation for the cost necessary to complete the work described in Section 2-03 will be made at the Bid item prices Bid only for the Bid items listed or referenced as follows:

1. "**Common Excavation**", per cubic yard.
2. "**Solid Rock Excavation**", per cubic yard.

The Bid item prices for "Common Excavation" and for "Solid Rock Excavation" shall include all costs for the work described in Section 2-03 and not otherwise provided for hereinafter. If the Engineer orders excavation more than 3 feet below Subgrade, that portion more than 3 feet below Subgrade will be paid as extra work per Section 1-09.4. Payment for such types and classes of excavation listed above shall be full compensation for excavating, loading, hauling, stockpiling, placing as backfill, or disposing of the Material as specified herein.

Payment for embankment work to bring the Subgrade in sidewalk areas to the level of the top of the sidewalk will be per Section 2-03.5. Payment for excavation of the Subgrade to the depth of the sidewalk will be paid per Section 8-14.

Payment for earthwork or for solid rock excavation required by the Contract where a Bid item is not provided in the Bid Form will be in accordance Section 1-04.1(2).

3. "**Unclassified Borrow**", per ton.
4. "**Borrow (Type)**", per ton.

The Bid item prices for "Unclassified Borrow" and for "Borrow (Type)" shall include all costs for the work required to excavate, haul, stockpile, and place the Material as indicated in the Contract. Compaction of borrow Material will be paid as "Embankment Compaction".

5. "**Embankment Compaction**", per cubic yard.

The Bid item price for "Embankment Compaction" shall include all costs for the work required to compact embankments.

Compaction of approved on-site excavated native Material and selected Material used for compaction of embankment will be paid as "Embankment Compaction" per cubic yard, as indicated above.

As indicated in Section 2-03.3(14)D, when the Engineer directs a change in embankment construction, the Owner will not increase the Bid item price, but will increase the Bid item quantity at the Bid item prices for the Bid items that apply in accordance with Section 1-04.6.

6. "**Unsuitable Foundation Excavation**", per cubic yard.

The Bid item price for "Unsuitable Foundation Excavation" shall include all costs for the work required to excavate or displace unsuitable foundation Material only by the methods set forth in Section 2-03.3(14)F and 2-03.3(14)G. These costs shall include disposal of the unsuitable Material, and leveling the upheaved Material outside of the embankment slopes when the unsuitable Material is displaced. Replacement Material will be paid as a separate Bid item.

See Section 1-04.1(2) if the Bid Form does not have a Bid item for unsuitable foundation excavation.

7. "**Drain, Vertical Sand**", per vertical foot.

The Bid item price for "Drain, Vertical Sand" shall include all costs for the work required to excavate the drain holes and for selecting, loading, hauling and placing the Material.

8. "**Drainage Blanket, Sand**", per ton or per cubic yard.

The Bid item price for "Drainage Blanket, Sand" shall include all costs for the work required for processing, hauling, and placing the Material.

*9. "**Stepped Slope Construction**", per cubic yard.*

The Bid item price for "Stepped Slope Construction" shall include all costs for the work required to build stepped slopes including disposal of excess material.

10. **Other payment information**

All costs for excavation, backfill, and recompaction of sampling pits shall be considered included in the Bid item prices for the various Bid items and no separate or additional payment will be made.

Density testing by Owner forces will be performed at no charge to the Contractor for the first test series at each Engineer designated location. If these tests indicate a failure to achieve required densities, re-testing shall take place after recompaction. Engineer expenses related to retesting will be charged to the Contractor as specified in Section 1-05.7.

Payment for overbreak Material used in lieu of borrow will be made at the Bid item price for the type of borrow specified.

If the Contractor has dressed a cut per Section 2-03.3(1) before the Engineer orders it widened, the Owner will pay for the resloping as provided in Section 1-09.4.

Excavation below grade required to remove a portion of the Subgrade made unsuitable by the Contractor's operations or failure to adequately protect the Subgrade shall be at the Contractor's sole expense and at no additional cost to the Owner.

All work required to complete slope treatment, including excavation, haul, and slope rounding, shall be included in the *Bid item price* for Roadway excavation.

All costs for building terraces as specified in Section 2-03.3(14)A shall be included in the Bid item prices for other applicable Bid items.

All costs and expenses involved in drying embankment Materials with whatever method is appropriate shall be considered incidental to the various Bid item prices and at no additional cost to the Owner.

If the Bid Form does not include Mineral Aggregate (Type) for rock embankment construction, payment will be as provided in Section 1-04.1(2).

The costs of pumping or digging temporary drainage ditches as required per Section 2-03.3(14)H shall be incidental to and included in other Bid items of Work that apply and shall be at no additional cost to the Owner.

Costs related to all bridge embankment and trestle work described in Section 2-03.3(14)J shall be incidental to the Work and shall be included in the Bid item prices for applicable Bid items.

All costs to remove, haul, and dispose of overbreak material which is deemed unsuitable for use by the Engineer shall be at the sole expense of the Contractor.

Payment for aeration shall be incidental to and included in the excavation and embankment Bid items.

When excavated Material unexpectedly falls short of the amount required to complete an embankment, the Owner will pay the Roadway excavation *Bid item price* for the volume of Material the overbreak replaces. However, no payment will be made if overbreak is used when other Material is available within the neat lines of the Roadway prism.

If an undue amount of excavated Material deemed suitable by the Engineer is wasted by the Contractor, the Contractor shall provide replacement material of the type acceptable to the Engineer at the Contractor's sole expense.

Any partially or fully completed embankment or stepped slope that loses stability and slides due to Contractor operations, such as continued hauling across the embankment or undercutting the slope, shall be fully restored by the Contractor at *the Contractor's sole expense.*

Should the Contractor fail to protect an aerated area prior to onset of inclement weather, all costs for additional aeration required to restore the area to its previous aerated condition shall be at the Contractor's sole expense.

Snow removal outside of Roadways shall be at the sole expense of the Contractor. Payment for snow removal within Roadways shall be in accordance with Section 1-07.23.

The cost of any permits and approvals required in Section 2-03.3(7) shall be included in the Bid item prices for the applicable Bid items of Work and no separate or additional payment will be made.

All costs associated with hauling, storing, and reusing selected Material, except in embankment compaction, shall be included in the Bid item prices of the various applicable Bid items.

SECTION 2-04 HAUL

2-04.1 DESCRIPTION

Section 2-04 describes work consisting of transporting excavated Material from its original site or borrow site to its final resting place on the Project Site or at a Waste site.

2-04.2 RESERVED

2-04.3 CONSTRUCTION REQUIREMENTS

Off-Highway earthmoving Equipment shall not haul on or across any *Street* not being improved in the Contract.

2-04.4 MEASUREMENT

Haul work will not be measured.

2-04.5 PAYMENT

Compensation for the cost necessary to complete the work described in Section 2-04 will be considered incidental to the various Bid items comprising the Work and no separate or additional payment will be made.

SECTION 2-05 RESERVED

SECTION 2-06 SUBGRADE PREPARATION

2-06.1 DESCRIPTION

Section 2-06 describes work consisting of the preparation of Subgrade for new and existing Streets, Alleys, driveways, or other public places, upon which surfacing is to be placed, or the preparation of the surfaced Roadbed, either new or existing, upon which the Pavement Structure is to be placed. All Subgrade preparation work shall be in accordance with the Contract and in close conformity with the lines, grades, and typical cross sections indicated on the Drawings or as established and staked by the Engineer.

Subgrade preparation for sidewalk shall be in accordance with Section 8-14.3(2).

2-06.2 MATERIALS

Materials shall meet the requirements of the following section:

Geotextile	9-05.22

The geotextile used for Subgrade stabilization shall be as specified in Section 9-05.22, Geotextile – Soil Stabilization.

2-06.3 CONSTRUCTION REQUIREMENTS

2-06.3(1) SUBGRADE FOR SURFACING

In preparing the Roadbed for surfacing, the Contractor shall:

1. Remove from the Roadbed, immediately before placing surfacing Materials, all brush, weeds, vegetation, grass and other debris
2. *Dispose of all debris*.
3. Drain water from all low spots or ruts.
4. Shape the entire Subgrade to a uniform surface running reasonably true to the line, grade, and cross-section staked by the Engineer.
5. If necessary, the Contractor shall process the Subgrade in cut areas to remove materials too coarse for mechanical trimming and recompaction.
6. Compact the Subgrade to a depth of 6 inches. Compaction shall achieve 95 percent of maximum density determined by tests described in Section 2-03.3(14)E. All portions of the surface on the Subgrade which are inaccessible to large compactor units shall be thoroughly compacted with smaller compactor units or mechanical tampers.
7. *Remove excess Material that does not drift to low spots during blading and shaping. The Contractor shall dispose of this excess by placing it where the Subgrade lacks Material or by wasting it.*
8. *Add Materials where the Subgrade needs more to bring it up to grade.* The Contractor shall water and compact these added Materials as needed to produce a true finished Subgrade.
9. Underground work in the area of the Subgrade shall be completed and properly backfilled and compacted before Subgrade work is started. This shall include the Work and work performed by the Owner or others.
10. If the underlying Subgrade is soft, spongy, or yielding and does not permit proper compaction, the Contractor shall stabilize the Subgrade per Section 2-06.3(3).

11. Where normal crown sections are being constructed, stakes will be set at convenient offsets at intervals not to exceed 50 feet and at closer intervals where necessary, such as at *Street* and *Alley* intersections. It shall be the responsibility of the Contractor to set centerline grades which may be needed except in cases where the *Street* grades are warped or otherwise do not conform with the typical section, in which case the Engineer will set the stakes.
12. The full width of the Roadway shall be kept well sprinkled with water before and during process of rolling the Subgrade.
13. Grade and line, throughout the stages of constructing the Subgrade, shall be secured from the reference stakes. The Subgrade shall be maintained in the finished condition until the first course of surfacing is placed upon it.

If the Contract requires a trimming machine, it shall:

1. Maintain the grade and transverse slopes automatically through sensors that respond to reference lines on both edges of each Roadway.
2. Create a smooth, uniform surface free from chatter and ripples.
3. Be subject to the Engineer's approval.

2-06.3(2) SUBGRADE FOR PAVEMENT

When Drawings call for concrete pavement to be placed directly on the Subgrade, the Contractor shall prepare the Subgrade as outlined in Section 2-06.3(1). This work shall include:

1. Removal of Subgrade for increased thickness of pavement, for pavement headers, and for increased thickness at pavement edges. This may be done just before the concrete is placed.
2. When the pavement is to be constructed over an old Roadbed composed of gravel and macadam, the old gravel or macadam shall be scarified and the Material shall be uniformly spread and thoroughly compacted.
3. Compaction of Subgrade shall extend to at least 1 foot beyond the pavement edge or to a width that accommodates the paving machine without visible distortion of the Subgrade.
4. *Thoroughly wetting the Subgrade with water from 12 to 48 hours before the concrete is to be placed and maintaining this wet condition until the concrete is placed.*
5. The Subgrade shall be compacted both before and after the forms are set.

2-06.3(3) SUBGRADE STABILIZATION

When the density of the native earth in a Roadway section is determined by the Engineer to be less than that required for the method of compaction specified for the earth embankment, or where the nature or condition of the earth below the designated Subgrade is such that it may impair the stability of the Subgrade, the Contractor shall stabilize the Subgrade by the method selected by the Engineer from among the following:

Method A: Thoroughly loosen the earth to a depth of 6 inches by scarifying, aerating or watering as applicable, and compact to the required density, or;

Method B: Excavate below grade to the limits and depth designated by the Engineer and by whose direction the excavated Material shall be temporarily stockpiled for use as backfill, placed in adjacent embankments, or, if unsuitable, wasted and replaced with selected *Material* or other designated backfill Material. If deemed necessary by the Engineer, the earth at the bottom of the excavation shall be loosened to a depth of 6 inches by scarifying, aerating or watering, as applicable, and compacted to the required density. The excavated area shall then be backfilled with the previously excavated and stockpiled, or selected, Material or with such other Mineral Aggregate backfill as may be ordered by the Engineer. Backfill shall be placed and compacted in successive layers in accordance with the compaction method required for embankments under the provisions of the Contract. Excavation below finish grade as set forth above shall be classified the same as the excavation above final grade.

Method C: Bring the exposed soil surface to the required line, grade and cross section. All protruding objects (rocks, sticks, debris) shall be removed and all holes and depressions filled. The Engineer may require additional depth of excavation and shaping the soil to the required line, grade and cross section. The geotextile, specified in the Contract (see Section 9-05.22), shall be placed as shown on the Drawings and shall extend a minimum of 2 feet beyond the placement of the fill Material. The geotextile sheets shall overlap a minimum of 2 feet and shall be placed in a manner such that the preceding roll overlaps the following roll in the direction of fill Material placement. If a geotextile is torn or damaged during construction, the damaged area shall be repaired by placing a large enough piece of geotextile to cover the damaged area and meet the overlap requirement in a manner acceptable to the Engineer. Fill Material shall be placed first on the top layer of geotextile to prevent Material from entering between and separating the overlapping geotextile layers. See Section 2-12 for geotextile construction requirements. Construction vehicles shall be limited in size and weight such that the rutting depth in the initial lift of fill above the geotextile is not greater than 2 inches. Compaction of the overlying fill shall be done in the static or non-vibratory mode. Wrinkles, folds or creases shall be kept to a minimum. The Engineer will approve the geotextile installation before it is covered with fill.

NOTE: There are other alternate methods of sub-grade stabilization which include the addition of lime or Portland cement mixed into Subgrade material. The Contractor may propose an alternate *method* by submitting the alternate method to the Engineer for approval at least 3 Working Days in advance. Should a Bid item not exist for the *approved* alternate method, payment shall be in accordance with Section 1-09.4.

2-06.3(4) MAINTENANCE AND PROTECTION OF SUBGRADE

Once prepared, the Subgrade for surfacing shall be maintained in a finished condition until the first course of crushed rock base or the finish pavement surface is ready to be placed. The Contractor shall maintain the Subgrade by blading and

compacting as frequently as may be necessary. All cuts, ruts, and breaks in the surface of the Subgrade shall be repaired in a manner acceptable to the Engineer prior to placing surfacing, treated base, or paving Materials.

The Contractor shall take steps necessary to protect the prepared Subgrade from inclement weather, the Contractor's operations, and public *Traffic* prior to the placement of crushed surfacing, gravel base, pavement, etc. These steps shall include, but are not limited to, the use of plastic sheeting to protect the Subgrade from inclement weather, planking to protect the Subgrade from the Contractor's Equipment, and the placing of paving Materials or base Materials from an adjacent lane in lieu of operating Equipment over the prepared Subgrade. Traffic detours shall comply with Sections 1-07.23 and 1-10.

Hauling over the finished Subgrade shall be limited to that which is essential for construction purposes. Equipment used for transporting Materials over the prepared Subgrade shall be equipped with pneumatic tires. Equipment used for hauling over the prepared Subgrade which, in the opinion of the Engineer, causes undue damage to the Subgrade or to the underlying Materials shall be removed from the Work upon request of the Engineer. *If approved by the Engineer, the Contractor may plank the Subgrade before hauling Materials or operating Equipment over it.*

During extended periods of seasonal inclement weather in which the Engineer deems it impractical or infeasible to protect the prepared Subgrade with plastic sheeting or planking and where the Contractor is required to operate Equipment over the prepared Subgrade in order to construct a crushed surfacing base course, treated base, or finished pavement, the Engineer may order the use of a ballast Material to stabilize and protect the Subgrade prior to paving. Stabilization shall be by Method B of Section 2-06.3(3) except the Roadway ballast shall be either *Mineral Aggregate* Type 2 or Type 14, whichever is designated by the Engineer. *Roadway ballast shall be used for Subgrade stabilization only when designated by the Engineer*.

2-06.4 MEASUREMENT

Bid items of Work completed pursuant to the Contract will be measured as provided in Section 1-09.1, Measurement of Quantities, unless otherwise provided for by individual measurement paragraphs herein this Section.

Preparation of the Subgrade is incidental to Subgrade preparation and no measurement will be made.

Subgrade stabilization by Method A in Section 2-06.3(3) will be measured by the cubic yard of embankment compaction in accordance with Section 2-03.4.

Subgrade stabilization by Method B in Section 2-06.3(3) will be measured by the cubic yard of the same class of excavation as that above grade, in accordance with Section 2-03.4.

Subgrade stabilization by Method C with geotextile in Section 2-06.3(3) will be measured by the square yard installed. Measurement will not be made for extra fabric required to meet overlap requirements. Additional excavation, if required in Method C, will be measured by the cubic yard in accordance with Section 2-03.4.

2-06.5 PAYMENT

Compensation for the cost necessary to complete the work described in Section 2-06 will be made at the Bid item prices Bid only for the Bid items listed or referenced as follows:

Unless otherwise specified in the Contract, all costs for the Subgrade preparation shall be included in the Bid item prices Bid for the various Bid items included in the Contract.

Subgrade stabilization by Method A in Section 2-06.3(3) will be paid as embankment compaction per Section 2-03.5.

Subgrade stabilization by Method B in Section 2-06.3(3) will be paid as excavation of the same class as the excavation above grade, in accordance with Section 2-03.5.

Payment for the geotextile for stabilization will be made in accordance with Section 2-12.5.

Mineral Aggregate backfill of the Type ordered by the Engineer used in lieu of selected native material will be paid as "Mineral Aggregate, (Type)" in accordance with Section 1-09.4.

SECTION 2-07 WATERING

2-07.1 DESCRIPTION

Section 2-07 describes work consisting of furnishing, hauling, and applying water for compacting embankments, constructing Subgrade, placing of crushed surfacing, dust control, flushing, testing, and as the Contract requires.

2-07.2 RESERVED

2-07.3 CONSTRUCTION REQUIREMENTS

2-07.3(1) GENERAL

The Contractor shall apply water upon Streets by means of tank trucks equipped with spray bars. Spray controls shall ensure that the water is applied uniformly and at a rate of coverage for the intended purpose. When the source of water is hydrants within the Work area, the Contractor may, with approval of the Engineer, apply water by means of a hose and reduced pressure backflow assembly device approved by the Washington State Department of Social and Health Services ("WSDSHS certification") directly connected to the hydrant. The Contractor shall have a copy of the "WSDSHS certification" on board the vehicle drawing water from the hydrant. Contractor shall furnish hose, Equipment, or tank truck necessary to do the required watering, and strictly comply with the provisions of the permit.

2-07.3(2) SOURCE OF WATER SUPPLY AND REGULATIONS PERTAINING TO HYDRANT USE

Within the SPU Water Operations direct service area, the source of water to be used on a Project is subject to approval by the Engineer. When the source of water is to be a hydrant, a hydrant use permit shall be obtained from, and use fees paid, when applicable, to the Water Service Section SPU Water Operations.

The Contractor shall use only those water sources or hydrants approved by the Engineer, and shall be in strict accordance with the requirements of City of Seattle Ordinance 65877 and the conditions of the permit.

2-07.4 MEASUREMENT

Bid items of Work completed pursuant to the Contract will be measured as provided in Section 1-09.1, Measurement of Quantities, unless otherwise provided for by individual measurement paragraphs herein this Section.

Water used in conjunction with work involving the water distribution system will not be measured.

Water used in conjunction with work other than the water distribution system will be measured.

2-07.5 PAYMENT

All costs associated with obtaining a hydrant use permit and providing and applying water to Work not involving the water distribution system shall be considered incidental to the various Bid items comprising the Improvement and no separate or additional payment will be made. See Section 4-07.5 for an exception where the Owner will pay for water.

All costs associated with providing and applying water to Work involving the water distribution system will be borne by the Owner including the hydrant use permit fee.

Where the Work involves both water distribution work and other work, no reimbursement of the hydrant permit fee will be made. Costs for non-water distribution work shall be incidental to the various non-water distribution Bid items and no separate or additional payment will be made except as specified in Section 4-07.5.

Water costs will be based on the prevailing rates as listed in Seattle Public Utilities' current standard charges.

SECTION 2-08 ROCK FACING

2-08.1 DESCRIPTION

Section 2-08 describes work consisting of constructing, rebuilding, and relocating rock facings used for erosion control or the containment of cuts and embankments. Work shall be performed in accordance with Standard Plan no. 141, and as designated in the Contract. Rock facing used for fire hydrant wall requirements as indicated on Standard Plan no. 313 shall comply with the requirements of Section 2-08.3(5).

2-08.2 MATERIALS

Materials shall meet the requirements of the following Sections:

Rock Facing Material	*9-03.17*
2" to 4" Quarry Spall	*9-13.7*

Crushed gravel with at least 90% of the total required quantity having two or more fractured surfaces each piece and also meeting the grading requirements of quarry spalls may be used in lieu of ledge rock.

2-08.3 CONSTRUCTION REQUIREMENTS

2-08.3(1) ROCK FACING

2-08.3(1)A GENERAL

Rock facings for other than fire hydrant wall requirements per Standard Plan no. 313 shall be constructed, rebuilt, or relocated at the locations and to the limits indicated on the Drawings and shall be limited to 8 feet in height. The Subgrade elevation and location of the rock facing shall be staked by the Engineer or, in the absence of such staking, shall be as described in the Contract.

Rock facing up to a 5-foot high wall will require rock from an approved source. Rock facing over 5 feet high will require rocks to be tested for quality as specified in Section 9-03.17 and submitted to the Engineer for approval.

Rock facing shall be used only against a slope which is verified stable without the addition of rock facing. This verification shall meet the requirements of Section 1-05.3(2)F.

2-08.3(1)B *ROCK FACING KEYWAY*

The first step in rock facing construction, after clearing and general site preparation, is to excavate a keyway for the base course of rock facing. The keyway shall be 3 to 12 inches deep (as shown on Standard Plan no. 141) extending over the entire length of the rock facing, and shall incline slightly downward toward the face of the cut or fill being protected by an approximate 4 horizontal to 1 vertical slope. The keyway width shall be at least 40% of the height of the proposed rock facing.

2-08.3(1)C ROCK SELECTION

The Contractor shall have sufficient working space so individual rock selection from a number of stockpiled rocks can satisfy the needs of the Project. The stockpile area shall not be placed on *Traffic* lanes or driveways. Rocks shall be of a generally cubical, tabular or rectangular shape, as opposed to rounded or tetrahedral forms, and shall be placed to match as closely as possible the spaces afforded by the next lower course of rocks. One-man rocks shall not be used on rock facings more than 3 feet high.

2-08.3(1)D ROCK PLACEMENT

The thickness of the rock facing, including the filter layer behind it, shall be approximately 40% of its height. *Where required in the Contract, a 6-inch drain pipe shall be installed in a keyway behind the rock facing, with sufficient gradient to initiate flow, and be piped to the curb, catch basin, or outfall as shown on the Drawings*.

The Contractor shall place the first course of rock on firm, unyielding soil (having a minimum load bearing capacity of 2000 pounds per square foot) at base elevations specified in Standard Plan no. 141. There shall be full contact between the rock and soil. This may require shaping of the ground surface*, or slamming or dropping the rocks into place when appropriate*, so that the soil foundation conforms to the shape of the rock face bearing on it. As an alternative, it may be necessary to place and compact crushed rock into the Subgrade to increase its load bearing capacity. Before placing the next level of rock facing, the Contractor shall place and compact filter Material behind and to the top of the rocks previously placed.

The Contractor shall use rock sizes as specified in Section 9-03.17, using the largest rocks at the bottom and progressively smaller rocks toward the top. The rocks shall be placed so that there are no continuous joint planes in either the vertical or lateral direction. *Each rock shall bear on at least two rocks below it, shall have at least 3 contact surfaces, and shall be set stable with no rocking*.

Rocks shall be placed in a manner that there is some bearing between flat rock faces rather than on joints. Horizontal joints between rock courses shall slope downward towards the embankment being protected.

The batter of the rock facing shall be 1:4 (horizontal to vertical) and shall be uniformly the same throughout the length of the rock facing. The face of individual rocks may vary no more than 3 inches from the batter or slope line of the rock facing.

Where voids, greater than four inches in dimension, exist in the face of the rock facing, they shall be visually examined to determine if contact between the rocks exists within the thickness of the rock facing. If there is contact, no further action is required. But if there is no rock contact within the rock facing thickness, some resetting is required. If there is a void measuring six inches or more near the inside face of the rock facing, the void shall be “chinked” with a smaller piece of rock. *This filler rock shall be placed with the longest dimension perpendicular to the face.*

If stability of an unprotected cut slope is of concern, the rock facing shall be constructed in short lengths. The final course shall be an even appearance and shall be placed so as to minimize erosion of the protected embankment.

2-08.3(1)E FILTER MATERIAL

The Contractor shall place a drainage filter of 2 inch to 4 inch quarry spall between the face of the embankment and the rear of the rock facing. The drainage filter shall be a minimum 6 inches in thickness.

2-08.3(1)F SLOPE ABOVE ROCK FACING

The slope of the terrain above the rock facing shall be no steeper than 3:1 (horizontal to vertical) to minimize an earth surcharge on the rock facing. Additional surcharge (such as a building, parking area, other Traffic area, and other loading above the rock facing, shall require a rock facing design by a licensed civil engineer in accordance with Section 1-05.3(2)F be submitted to the Engineer for approval. The unimproved area above the rock facing shall be hydroseeded for erosion control.

2-08.3(2) REBUILD ROCK FACING

This work shall consist of dismantling an existing rock facing and reconstructing the facing in the same location. Reconstruction work shall be in accordance with the requirements of Section 2-08.3(1). Rock dismantled from the existing facing may be used in reconstructing the rebuilt rock facing if the rock is approved by the Engineer as meeting the rock quality requirements of Section 9-03.17. Additional rock ordered by the Engineer to complete the facing shall be furnished by the Contractor and shall meet the requirements of Section 2-08.2. *Existing drainage rock behind the existing rock facing shall be replaced with 2 inch to 4 inch quarry spall for the rebuilt rock facing.*

The Contractor shall sequence the removal and rebuild in such a manner as to limit the length of exposed slope. Each Working Day, a length of up to twice the height of the existing rock facing may be removed. Each Working Day, rebuilding the rock facing shall proceed in a manner providing the shortest length of unfinished rock facing full height. The removal and rebuild shall be coordinated as to limit the exposure of unrocked embankment.

2-08.3(3) RELOCATE ROCK FACING

This work shall consist of dismantling an existing rock facing and rebuilding a similar rock facing in a different location using the rock obtained from the dismantled facing. Work shall be in accordance with the requirements of Sections 2-08.3(1) and 2-08.3(2). Additional rock ordered by the Engineer to complete the facing shall be furnished by the Contractor and shall meet the requirements of Section 2-08.2. *Existing drainage rock behind the existing rock facing shall be replaced with 2 inch to 4 inch quarry spall for the relocated rock facing.*

2-08.3(4) CONTRACTOR QUALIFICATIONS

The rock facing Contractor or Subcontractor shall furnish written evidence of at least 5 rock facing constructions within the 2 years preceding the date of Advertisement for Bids and shall invite inspection of at least two of these rock facings which are similar to the proposed rock facing(s) in the Contract as determined by the Engineer.

2-08.3(5) ROCK FACING FOR HYDRANTS

Where rock facings are required as wall requirements for fire hydrants as indicated on Standard Plan no. 313, the rock facing construction shall be as specified in Sections 2-08.3(1) with the following exceptions:

1. *The depth of the keyway shall be 1' – 0" minimum;*
2. *The filter Material behind the rock facing shall be Mineral Aggregate Type 2 with a minimum thickness of 6 inches.*
3. *The maximum height of rock facing shall not exceed 5 feet as measured from finished grade to top of rock facing.*
4. *The sizes of rock facing shall meet the requirements of the Table listed on Standard Plan no. 141 with "h" measured from finished grade to top of rock facing.*

5. *The maximum slope behind the rock facing shall be no steeper than 2 horizontal to 1 vertical.*
6. *Finished grade in front of the rock facing shall be with a minimum 6 inch compacted depth of Mineral Aggregate Type 2.*
7. *No weep holes and no subsurface drain are required behind the rock facing.*
8. *Each rock facing rock shall bear on at least 3 points without rocking. Voids greater than 4 inch on either the outside face or inside face shall be chinked with a smaller rock ensuring stability of the rock facing.*

2-08.4 MEASUREMENT

Bid items of Work completed pursuant to *the Contract* will be measured as provided in Section 1-09.1, Measurement of Quantities, unless otherwise provided for by individual measurement paragraphs *herein* this Section.

Measurement for "Rock Facing" and for "Relocate Rock Facing" will be by the square foot of rock face for the new rock facing or for the relocated rock facing.

Measurement for "Rebuild Rock Facing" will be by the square foot based on measurement of the finished rock facing.

Measurement will include the entire front face of the constructed rock facing including the keyway.

Quarry spall drainage Material will be measured by the ton.

Filter Material other than quarry spall will be measured by the cubic yard in accordance with Section 4-01.4.

2-08.5 PAYMENT

Compensation for the costs necessary to complete the work described in Section 2-08 will be made at the Bid item prices Bid only for the Bid items listed or referenced as follows:

1. "**Rock Facing**", per square foot.

The Bid item price for "Rock Facing" shall include all costs for the work required to furnish and place the rock, including excavation of keyway and of embankment.

Payment for drainpipe, when called for in the Contract, will be paid as "Subsurface Drain" per Section 7-01.

2. "**Rebuild Rock Facing**", per square foot.
3. "**Relocate Rock Facing**", per square foot.

The Bid item prices for "Rebuild Rock Facing" and for "Relocate Rock Facing" shall include all costs for the work required to dismantle and reconstruct the rock facing as specified using the existing rock. It also includes temporary stockpiling of the rock, such excavation as may be necessary to rebuild or relocate the rock facing, disposal of existing rock or drainage aggregate, and furnishing additional drainage aggregate as necessary.

Costs required to import and place additional rock, or replace existing rock in order to rebuild or relocate rock facing shall be addressed per Section 1-09.4.

4. **Other payment information**

Payment for quarry spall or other filter Material specified for drainage filter Material will be per Section 4-01.5.

SECTION 2-09 STRUCTURE EXCAVATION

2-09.1 DESCRIPTION

Section 2-09 describes work consisting of excavating, removing, and disposing of all formations, debris, and materials, natural or man-made, irrespective of nature or condition, encountered within the neat line limits defined in Section 2-09.4, such work being necessary for the construction of foundation Structures required to support pump stations, water tanks, transmission towers, bridges, retaining walls, sign support Structures, and other Structures called for in the Contract. All excavation work shall be done in reasonable conformity with the lines, grades, and dimensions indicated on the Drawings or staked by the Engineer. This work also includes stockpiling, hauling, and placing suitable excavated Material in fill areas, and disposing of excess or unsuitable material.

This work shall also include the construction and subsequent removal of shoring or cofferdams, along with necessary pumping, sealing, and dewatering of the excavated area, the furnishing, stockpiling, placing and compacting of *selected* excavated or imported Material over and around the completed Structure.

Excavation for Roadways, sanitary Sewers, Water Mains and their appurtenances, manholes, inlets, catch basins, conduits, utility Structures, and such other related miscellaneous work are covered elsewhere in the Standard Specifications and shall not be considered as Structure excavation.

2-09.2 MATERIALS

Materials shall meet the requirements of the following sections:

Portland Cement	9-01
Aggregate for Portland Cement Concrete	9-03.1
Fly Ash and Admixture for Concrete	9-23.6
Water	9-25

2-09.3 CONSTRUCTION REQUIREMENTS

2-09.3(1) GENERAL REQUIREMENTS

All structure excavation, trenching, and shoring shall be performed in compliance with Chapter 296-155 WAC as well as all other applicable local, State, and Federal laws and regulations.

2-09.3(1)A STAKING, CROSS-SECTIONING, AND INSPECTING

The Contractor shall not begin excavating until after the Engineer has set stakes to locate and/or outline the structure and taken cross-sections to determine how much Material to remove. The Engineer will occasionally inspect material taken from and material remaining in the excavation.

When any foundation excavation is completed, the Contractor shall notify the Engineer, and no concrete or other permanent structural Material shall be placed therein until permission to proceed is given by the Engineer.

2-09.3(1)B DEPTH OF EXCAVATION

Foundation pits shall be excavated to the Contract specified depth unless otherwise directed by the Engineer.

2-09.3(1)C REMOVAL OF UNSTABLE BASE MATERIAL

When the material at the bottom of an excavation is not stable enough to support the Structure as determined by the Engineer, the Contractor shall excavate below grade and replace the unstable material with gravel backfill.

Gravel backfill shall meet the requirements of Section 9-03.12, and shall be placed and compacted in layers not more than 6 inches thick compacted to 95 percent of the maximum density determined by the specified test in Section 2-03.3(14)E.

2-09.3(1)D DISPOSAL OF EXCAVATED MATERIAL

The Material obtained from structure excavation shall be used for backfilling over and around the Structures after they are complete. Material not required for this purpose shall be used in the construction of embankments, stockpiled per Section 2-03.3(10), or if deemed unsuitable by the Engineer per Section 2-03.3(14)F, wasted per Section 2-01.2. Material which meets the requirements for *Mineral Aggregate* Type 17 shall be selectively stockpiled for use as wall or abutment backfill.

2-09.3(1)E BACKFILLING

Openings made for Structures shall be backfilled with selected Material from the structure excavation or from other excavations. In general, selected backfill Material from the excavation shall be as defined in Section 2-03.3(10).

Alternative Source. *When Material from structure excavation is unsuitable for use as backfill, the Engineer may:*

1. *require the Contractor to obtain Material elsewhere; or*
2. *require the Contractor to substitute selected Material in accordance with Section 2-03.3(10); or*
3. *require the Contractor to use other Material covered by the Contract.*

If such substitution, as listed above and required by the Engineer, involves work that does not differ greatly from what would otherwise have been required by the Contract, then this work shall be at Bid item prices. If selected materials are not available or Bid item Materials are not in the Contract, work shall be in accordance with Section 1-04.4.

Stockpiling. *The Engineer may require the Contractor to selectively remove and stockpile any usable Material excavated for a structure and may replace a specified Mineral Aggregate Type as wall or abutment backfill*.

If the Contractor stockpiles excavated Material for use as backfill, it shall be protected with a durable cover from weather damage and from being tainted by intermingling with other materials. If the Material in the stockpile becomes too wet or intermixed with inferior Material, the Contractor shall dispose of it and replace it with an equal amount of suitable Material.

Compaction. Backfill from structure excavation shall be placed and compacted in keeping with these requirements:

1. Backfill supporting Roadbed, Roadway embankments, or any Structure shall be placed in horizontal layers no more than 6 inches thick with each layer compacted to 95 percent of the maximum density determined by the Compaction Control Test, Section 2-03.3(14)E.
2. Gravel backfill for drains shall be placed in horizontal layers no more than 12 inches thick, with each layer compacted by at least 3 passes of a vibratory compactor approved by the Engineer.
3. All other structure excavation backfill shall be placed in layers no more than 2 feet thick (loose), with each layer compacted and graded so that final settling leaves the backfill flush with surrounding ground.

Timing. Backfill shall not be placed against any concrete Structure until the concrete has attained 90 percent of its design strength and has cured for at least 14 Days. However, the Contractor may backfill footings and columns as soon as forms have been removed, so long as the backfill is brought up evenly on all sides.

The Engineer may order the Contractor to use structural backfill Controlled Density Fill; or require the Contractor to obtain Material from an alternative source. Material obtained from an alternative source will be paid for in accordance with Section 1-09.4.

Structural backfill Controlled Density Fill (CDF) shall meet the following requirements:

Structural Backfill Controlled Density Fill (CDF)	
Ingredients	**Amount per cubic yard**
Portland Cement	50lb.
Fine Aggregate Class 1 or 2	3,300 lb. (3,500 lb. when Fly Ash Class C is used)
Air Entrainment Admixture	Per manufacturer's recommendation
Fly Ash Class F or Fly Ash Class C	300 lb. 150 lb.
Water	300 lb. (maximum)

The CDF consistency shall be flowable (approximate slump 3 to 10 inches). If requested by the Contractor, the proportions may be adjusted with the approval of the Engineer.

The producer shall provide a Manufacturer's Certificate of Compliance for each truckload of Controlled Density Fill. The Manufacturer's Certificate of Compliance shall verify that the delivered Material is in compliance with the mix design and shall include:

1. *Project Contract number,*
2. *Date,*
3. *Truck number,*
4. *Batched weights of each ingredient, and*
5. *Signature of the Supplier affirming the accuracy of the information provided.*

Compaction of Controlled Density Fill will not be required.

If water is present and prevents the Contractor from properly placing and compacting backfill as determined by the Engineer, it shall be removed by pumping or other means.

Special precautions shall be taken to prevent any wedging action against abutments and wing walls. If the excavation has sloping sides, the slopes shall be broken up by stepping or serrating to prevent wedge action before the backfill is placed. Fill placed around Culverts, piers or underground utilities shall be deposited on both sides to approximately the same elevation at the same time.

Backfill Material for walls shall conform to the requirements for *Mineral Aggregate* Type 17. It shall be placed in layers not to exceed 12 inches thick, and shall be compacted to 95% of maximum dry density. Compaction control tests shall be performed per Section 2-03.3(14)E.

Foundation backfill conforming to the requirements for *Mineral Aggregate* Type 2 or Type 14 shall be placed in layers not to exceed 6 inches, with each layer being thoroughly compacted in accordance with Method C as described in Section 2-03.3(14)D before the next succeeding layer is placed.

If the Material used in making the backfill is too dry to permit proper compaction, sufficient water shall be added to allow *acceptable* compaction results.

2-09.3(2) CLASSIFICATION OF STRUCTURE EXCAVATION

Structure excavation will not be further classified into solid excavation.

2-09.3(3) STRUCTURE EXCAVATION

2-09.3(3)A PRESERVATION OF CHANNEL

When foundations or Substructures are to be built in or next to running streams, the Contractor shall:

1. Excavate inside cofferdams, caissons, or sheet piling unless dredging or open pit excavation is permitted.
2. Never disturb the natural stream bed next to the Structure.
3. Backfill after foundations are placed inside cofferdams and any open pit or dredged area behind sheet piling. This backfill shall be level with the original stream bed and shall prevent scouring.
4. Remove any excavation material that may have been deposited in or near the stream so that the stream bed is free from obstruction.
5. Maintain water depth and horizontal clearances required for *Traffic* to pass on navigable streams, furnishing any channel signals or lights required during construction.
6. Place riprap around the outside of cofferdams to repair local scour.

2-09.3(3)B EXCAVATION IN OPEN PITS - EXTRA EXCAVATION

The Contractor may dig open pits or perform extra excavation without shoring or cofferdams if:

1. Footings can be placed in dry material away from running water.
2. The integrity of the completed Structure and its surroundings is not reduced.
3. Worker safety is ensured as required by law.
4. The excavation does not disturb the existing pavement or any other adjacent facilities.

If a slide occurs in an open pit, the Contractor shall remove the slide material. If the slide disturbs an area over which a Roadway is to be built, the Contractor shall backfill and compact the site to the original ground line.

The Contractor shall drain or pump any water from the pit, taking care not to soften or adversely impact the pit bottom. If Equipment in the pit or inadequate water removal makes the foundation Material unstable, the Contractor shall, at no expense to the Owner, remove and replace it with Material the Engineer approves.

When the Engineer believes ground water flow may impair a concrete footing, the Contractor shall place under it a layer of gravel at least 6 inches thick. Before placing the gravel, the Contractor shall excavate to whatever grade the Engineer requires. This provision shall not apply to the building of concrete seals.

The Contractor may omit forms when the earthen sides of a footing excavation can stand vertically. In this case, the Contractor may excavate to the neat line dimensions of the footing and pour concrete against the undisturbed earth. *If the hole is larger than neat line dimensions, the Contractor shall bear the entire cost of all extra Material and work*.

2-09.3(3)C PREPARATION FOR PLACING FOUNDATIONS

When a foundation is to rest on rock, excavation shall penetrate the rock at least 1 foot, or more if the Drawings require, to form a key for the footing. The Contractor shall cut the bottom of the excavation to a firm surface, level, stepped, or serrated as indicated in the Contract, and remove all loose Material.

For an arch abutment, the back face shall be trimmed to true lines so that concrete can be poured against undisturbed material.

If concrete is to rest on any excavated surface other than solid rock, the Contractor shall not disturb the bottom of the excavation. The Contractor shall also remove all loose or soft Material just before pouring the concrete.

Upon completing any foundation excavation, the Contractor shall notify the Engineer. No concrete or other permanent part of the Structure may be placed until the Engineer has accepted the prepared foundation.

2-09.3(3)D SHORING AND COFFERDAMS

All excavations within 15 feet of the Traveled Way and 4 feet or more in depth shall be shored, or protected by cofferdams. All other excavation 4 feet or more in depth shall be shored, or protected by cofferdams or shall meet the open-pit requirements of Section 2-09.3(3)B.

The Contractor shall use cofferdams in all excavation that is under water or affected by ground water.

In using cofferdams or shoring, the Contractor shall:

1. Extend them well below the bottom of the excavation.
2. Provide enough clearance for building forms, inspecting concrete exteriors, and pumping water that collects outside the forms. If cofferdams or shoring tilt or move laterally during placement, the Contractor, at no expense to the Owner, shall straighten or enlarge them to provide the required clearance.
3. Secure the shoring or cofferdam in place to prevent tipping or movement.
4. Place shoring and cofferdams so that they do not interfere with any pile driving required.
5. Vent cofferdams at the elevation commensurate with seal weight design, or as *required* in the *Contract*.
6. Remove any bracing that would extend into the concrete being placed.

When work requiring shoring or cofferdam is completed, the Contractor shall:

1. Remove all shoring to at least 2 feet below finished ground line.
2. Remove all cofferdams to the natural bed of the waterway.

Cofferdams shall be classified as any watertight enclosure that surrounds the excavated area of the Structure and which is used in conjunction with a concrete footing seal. Within the protection of the cofferdam, the excavation is carried to the desired level and the concrete seal is poured, the enclosure is dewatered and the Structure is constructed.

If the Contract requires cofferdam and should water conditions at the time of construction be such that in the opinion of the Engineer, seals are not required, the Engineer may specify that seals be omitted.

Excavation outside the cofferdam shall not continue below the elevation of the top of the seal, or if no seal is used, below the top of the footing. The Contractor shall anchor or otherwise hold the shoring or cofferdam in place and secure it against tipping or displacement.

Cofferdams shall be constructed so as to protect newly placed concrete against damage from sudden rising of the water and to prevent damage to the foundation by scour, erosion, or uplift. No timber or bracing shall be left in the cofferdams in such a way as to extend into the Substructure.

The Contractor shall submit Shop Drawings prepared by a professional engineer in accordance with Section 1-05.3(2)F showing proposed methods and construction details of shoring or cofferdams. The Contractor shall not begin construction until the submittal has been reviewed and returned by the Engineer. The Contractor shall be responsible for acceptable results. Calculations supporting the shoring or cofferdam design shall be submitted with the Shop Drawings. The Shop Drawings shall contain details such as member sizes, plate thickness, weld details, bolted connections, etc. and shall be based on AASHTO specifications.

2-09.3(3)E BEARING TESTS

The Engineer may stop the excavation to make bearing tests at any time. The Contractor shall assist with these tests in any way the Engineer requires.

During any test period, the Contractor shall, at no expense to the Owner, maintain ordinary working conditions at the bottom of the hole. *A single bearing test will not exceed 72 hours.*

2-09.3(3)F DEWATERING

When conditions are encountered which, in the opinion of the Engineer, make it impracticable to dewater the foundation pit before placing concrete, the Engineer may require the construction of a concrete foundation seal in accordance with Section 6-02.3(6)C “Placing Concrete in Foundation Seals”, and dewatering in accordance with Section 6-02.3(6)D, “Dewatering Concrete Seals and Foundation”.

2-09.3(4) CONSTRUCTION REQUIREMENT FOR TRENCH (OR OTHER EXCAVATIONS) 4 FEET OR MORE IN DEPTH

The requirements of Section 2-09 shall apply to all types of excavation in so far as they do not conflict with the excavation requirements found in other Sections of the Contract for a specific kind of Work.

If workers enter any trench or other excavation 4 feet or more in depth that does not meet the open pit requirements of Section 2-09.3(3)B, the trench or excavation shall have a protective system. For safety systems required for trench excavation, refer to Section 7-17.3(1)A7a.

2-09.4 MEASUREMENT

Bid items of Work completed pursuant to *the Contract* will be measured as provided in Section 1-09.1, Measurement of Quantities, unless otherwise provided for by individual measurement paragraphs *herein* this Section.

The materials excavated will be measured in their original position by volume in cubic yards. *The quantity measured* will include only the Material excavated from within the neat line shown on the Drawings, regardless of whether the excavation is made within a cofferdam enclosure or in an open pit.

The vertical neat line limits for measuring the excavation will be a vertical plane 1 foot (measured horizontally) outside of and parallel to the neat line of a pile cap, footing, or seal. No measurement as *"Structure Excavation"* will be made for Material removed (1) outside of vertical planes 1 foot outside of and parallel to the neat lines of a pile cap, footing, or seal, (2) more than 3 feet beyond the Roadway side of a wing wall, and (3) more than 1 foot beyond the other sides and end of a wing wall.

The bottom limits for measuring the excavation for pile caps, footings, or seals will be the bottom elevation as shown *on the Draw*ings or as otherwise established by the Engineer. In pile foundations, the material resulting from the swell due to driving piles will not be included in the measured quantity. The bottom limit for a wing wall will follow a line 1 foot below and parallel to the bottom.

The upper limit for measuring excavation will be the top surface of the ground, or the bed of the stream, as it exists at the time the excavation is started. When the Contract designates removal of the materials through a graded section above the structure excavation, and when there is a designated *Bid item* in the Contract for the *graded* excavation above, the upper limit for structure excavation will be the lower neat lines of the designated grading section, as shown *on the Draw*ings.

Measurement for imported Mineral Aggregate, when ordered for backfill in lieu of native Material by the Engineer, will be by the cubic yard placed based on the excavation neatlines in the Standard Plans, or as shown on the Drawings, or as otherwise designated by the Engineer.

Backfill for foundations, drains, and walls will be measured by the cubic yard per Section 1-09.1.

Measurement for concrete seal will be as “Concrete (Class) (Use)” as specified in Section 6-02.4.

Controlled density fill will be measured by the cubic yard for the quantity of Material placed.

Measurement for "Trench Safety Systems in Structural Excavation" will be per lump sum. Where forms or other structures are installed or constructed in an excavation so as to reduce the dimension measured from the forms or other structures to the side of excavation including the installation of pipe within this area, this will be included in the lump sum measurement for " Trench Safety Systems in Structural Excavation". Measurement for "Safety Systems in Trench Excavation, Minimum Bid = $0.40 per Square Foot" in accordance with Section 7-17.4 will be for trench excavation associated with pipe installation as described in Division 7 and not part of the structural excavation.

2-09.5 PAYMENT

Compensation for the cost necessary to complete the work described in Section 2-09.5 will be made at the Bid item prices Bid only for the Bid items listed and referenced as follows:

1. “**Structure Excavation**”, per cubic yard.

The *Bid item price* for “Structure Excavation” shall include all costs for the work required in Section 2-09 but not otherwise provided for in this payment section and which is necessary to complete the excavation within the neat line limits specified. Any additional excavation outside these limits, having been made for the Contractor’s benefit, shall be considered incidental to the various *Bid* items comprising this Improvement. All costs for preserving and protecting excavated materials to be used for backfilling structure excavation and all costs for disposal (including haul) of Material obtained from structure excavation which is not used for backfill shall be incidental to and included in the *Bid item price* for “Structure Excavation”.

All costs for storing, protecting, rehandling, and placing stockpiled Material as specified in Section 2-09 shall be included in the *Bid item price for "Structure Excavation"*.

2. “**Shoring or Extra Excavation**”, lump sum.

The *Bid item price for “Shoring or Extra Excavation” shall include all costs for the work required to construct, maintain and remove all shoring, or perform extra excavation including hauling, temporary stockpiling, and disposing*.

No change will be made to the *Bid item price* for “Shoring or Extra Excavation” for increased depth, to and including a depth of 3 feet below the elevations shown in *the Contract*. If depths greater than 3 feet below the elevations shown are required by the Engineer, *payment* for extra costs will be made in accordance with Section 1-09.4.

When extra excavation is used in lieu of constructing the shoring, cofferdam or caisson, the *Bid item price* shall be full pay for all excavation, backfill, compaction, and other work required.

If selected backfill Material is required for backfilling within the limits of structure excavation, it shall also be required as backfill Material for the extra excavation at the Contractor’s cost.

Shoring or extra excavation for other classes of excavation shall be incidental to and included in the *Bid item price* for Bid Items requiring the excavation and shall include removal of the shoring or backfilling of the extra excavation.

3. "**Cofferdam**", per lump sum.

The *Bid item price* for "Cofferdam" shall include all costs for the *work required to furnish, install, maintain, and remove the cofferdam including dewatering.*

4. *"Trench Safety Systems in Structural Excavation", per lump sum.*

The Bid item price for "Trench Safety Systems in Structural Excavation" shall include all costs for the work necessary to furnish, install, maintain, and remove trench safety systems in structural excavations.

5. **Other payment information.**

Payment for safety systems required in trench excavation for pipe installation as described in Division 7 and other than in structural excavation will be made in accordance with Section 7-17.5.

Payment for imported *Mineral Aggregate* backfill will be per Section 4-01.5.

Payment for Mineral Aggregate, when ordered for backfill in lieu of native Material by the Engineer, will be in accordance with Section 1-09.4.

Concrete seal will be paid as "Concrete (Class) (Use)" per Section 6-02.5.

Payment for reconstruction of surfacing and paving within the limits of structure excavation will be at the *applicable Bid item prices for the Bid items involved*.

Stockpiled excavated Material for use as backfill that is intermingled with unsuitable Material and/or weather damaged shall be disposed of and replaced with sound, untainted fill Material at the Contractor's *sole expense*.

Whenever excavation is carried below the elevation shown on the Drawings without written approval from the Engineer, all costs for Materials, labor and Equipment necessary to bring excavation back to the elevation shown on the Drawings, shall be at the sole expense of the Contractor. Replacement shall be made with concrete or other Material acceptable to the Engineer.

When ordered by the Engineer to use Controlled Density Fill in backfilling around piers and in front of abutments and walls, the Owner will pay in accordance with Section 1-09.4.

If a slide occurs in an open pit as described in Section 2-09.3(3)B, all costs related to removing slide Material and restoring a slide area shall be at the Contractor's sole expense.

All labor and materials the Contractor provides for the bearing tests as specified in Section 2-09.3(3)E will be paid in accordance with Section 1-09.4.

All costs not defined in Section 2-09.3(1)E that relate to providing, placing, and compacting backfill shall be included in the Bid item prices of the applicable Bid items.

SECTION 2-10 DITCH AND CHANNEL EXCAVATION

2-10.1 DESCRIPTION

Section 2-10 describes work consisting of excavating ditches and making channel changes to the required lines, grades, and cross-sections, and the installation of geotextile, filter blanket and riprap protection as indicated in the Contract. The work shall also include disposing of excess and unsuitable excavated Material.

2-10.1A CLASSIFICATIONS

Ditch excavation: Includes all excavation for open ditches less than 8 feet wide at the bottom, but excludes ditches that are part of the Roadway.

Channel excavation: Includes all excavation for open ditches 8 or more feet wide at the bottom.

2-10.2 MATERIALS

Materials shall meet the requirements of the following sections:

Filter Material	9-03.16
Geotextile	9-05.22

The ditch lining geotextile shall be as specified in Section 9-05.22, Geotextile – Ditch Lining.

The filter blanket shall meet the gradation requirements for the ballast as called out in the Contract.

2-10.3 CONSTRUCTION REQUIREMENTS

Work in ditches and channels over 4 feet deep are subject to the safety provisions of Section 7-17.3(1)A7a.

Before excavating any ditch, the Contractor shall clear and grub the area as required by Section 2-01.

The Contractor may build temporary dikes or berms with excavated Material or dispose of it.

When the use of a geotextile for Scour and Erosion Control is called for in the *Contract* or ordered for this purpose by the Engineer, the area of soil to be protected shall be graded to as smooth and uniform a surface as possible. All protruding objects (rocks, sticks, debris) shall be removed and all holes shall be filled with suitable Material.

Unless otherwise specified in *the Contract*, the geotextile shall be overlapped a minimum of 2 feet at all longitudinal and transverse joints. The geotextile shall be placed so that the upstream geotextile overlaps the downstream geotextile.

When placed on slopes, the upslope geotextile shall overlap the downslope geotextile. When the geotextile is placed against a structure, it shall extend 2 feet beyond the structure and shall be held in place with a filter blanket, if called for, and with riprap. A geotextile in an active water environment shall always be adequately protected with a filter blanket and/or riprap. See Section 2-12 for geotextile construction requirements.

Placement of a filter blanket, riprap, or both, on the geotextile shall start at the toe of the slope and proceed upwards. The geotextile shall be keyed at the top and toe of the slope as shown on the Drawings. The geotextile shall be secured to the slope loosely enough so that it does not tear when riprap is placed on top of it. The geotextile shall not be keyed at the top of the slope until the riprap is in place to the top of the slope.

All voids in the riprap face that allow the geotextile to be visible shall be backfilled with quarry spalls or filter material as designated in the Contract, until the geotextile is completely covered. When a filter blanket is required between the geotextile and the riprap, it shall have a minimum thickness of 12 inches, unless otherwise indicated in the Contract. A filter blanket will be required when hand-placed riprap, sack riprap, or concrete slab riprap is used with the geotextile. See Section 2-12 for geotextile construction requirements.

Grading of slopes after placement of the riprap will not be allowed if grading results in stone movement directly on the geotextile. Riprap shall not be dropped from a height greater than 1 foot above the geotextile.

2-10.4 MEASUREMENT

Bid items of Work completed pursuant to *the Contract* will be measured as provided in Section 1-09.1, Measurement of Quantities, unless otherwise provided for by individual measurement paragraphs *herein* this Section.

The Owner will measure ditch and channel excavation by the cubic yard in its original site and will calculate quantities by the neat lines of the staked cross-sections.

The geotextile will be measured in accordance with Section 2-12.4.

The filter Material *will* be measured by the cubic yard.

Safety systems in ditches and channels over 4 foot depth, not including pipe installation work in Division 7, will be measured by lump sum.

2-10.5 PAYMENT

Compensation for the cost necessary to complete the work described in Section 2-10 will be made at the Bid item prices Bid only for the Bid items listed or referenced as follows:

1. "**Ditch Excavation**", per cubic yard.
2. "**Channel Excavation**", per cubic yard.

The Bid item prices for "Ditch Excavation" and for "Channel Excavation" shall include all costs for the work required for excavation, shaping, loading, placing, stockpiling, disposing, and as necessary for the applicable excavation.

3. ***"Safety Systems in Ditch and Channel Excavation"****, per lump sum.*

The Bid item price for "Safety Systems in Ditch and Channel Excavation" shall include all costs for the work necessary to provide safety systems for ditch and channel excavation over 4 foot in depth. See Division 7 for payment of trench safety systems where ditch and channel work requires pipe and related structure work.

4. **Other payment information**

Filter Material, when required, will be paid as "Mineral Aggregate, (Type)" of the type specified in the *Contract* and described in Section 4-01.5.

Payment for geotextile *will* be in accordance with Section 2-12.5.

SECTION 2-11 TRIMMING AND CLEANUP

2-11.1 DESCRIPTION

Section 2-11 describes work consisting of dressing and trimming the Roadway(s) indicated in the Contract, including frontage roads, connecting ramps, Auxiliary Lanes, and approach roads. This work extends to Roadbeds, shoulders, and ditches.

2-11.2 RESERVED

2-11.3 CONSTRUCTION REQUIREMENTS

The Contractor shall:

1. Trim shoulders and ditches to produce smooth surfaces and uniform cross-sections that conform to the grades set by the Engineer.
2. Open and clean all channels, ditches, and gutters to ensure proper drainage.
3. Dress the back slope of any ditch or borrow pit that will remain adjacent to the Roadway. Round off the top of the back slope and distribute the Material evenly along its base.
4. Remove and dispose of all weeds, brush, refuse, and debris that lie on the Roadbed, shoulders, ditches, and slopes.
5. Remove from paved shoulders all loose rocks and gravel.
6. Distribute evenly along the embankment any Material not needed to bring the shoulders to the required cross-section.

The Contractor shall not:

1. Use heavy Equipment (tractors, graders, etc.) to trim the shoulders of an existing or new bituminous surface.
2. Drag, push, or scrape Shoulder Material across completed surfacing or pavement.

When the Contract requires the Contractor to rebuild part of a Roadway, only the rebuilt areas shall be trimmed and cleaned up.

Trimming and cleanup in ditch and channel over 4 feet deep shall require safety systems as specified in Section 2-10.3.

2-11.4 MEASUREMENT

Work described in Section 2-11 will not be measured.

Measurement for safety systems related to ditch and channel cleanup will be as specified in Section 2-10.4.

2-11.5 PAYMENT

All costs for the work required for trimming and cleanup shall be incidental to the various Bid items comprising the Work and no separate or additional payment will be made.

Payment for safety systems related to ditch and channel cleanup will be as specified in Section 2-10.5.

SECTION 2-12 CONSTRUCTION GEOTEXTILE

2-12.1 DESCRIPTION

Section 2-12 describes work consisting of furnishing and placing construction geotextile as indicated in the Contract.

2-12.2 MATERIALS

Materials shall meet the requirements of the following Section:

Construction Geotextile	9-05.22

Geotextile roll identification, storage, and handling *shall comply with ASTM D 4873.* During periods of shipment and storage, the geotextile shall be stored off the ground. The geotextile shall be covered at all times during shipment and storage such that it is fully protected from ultraviolet radiation including sunlight, site construction damage, precipitation, chemicals that are strong acids or strong bases, flames including welding sparks, temperatures in excess of 160 °F, and any other environmental condition that may damage the physical property values of the geotextile.

Geotextile required for underground drainage shall be “Moderate Survivability” and “Drainage Class C” and geotextile for permanent erosion control shall be “High Survivability” and “Drainage Class C”.

2-12.3 CONSTRUCTION REQUIREMENTS

2-12.3(1) GENERAL

The area to be covered by the geotextile shall be graded to a smooth, uniform condition free from ruts, potholes, and protruding objects such as rocks or sticks. The geotextile shall be spread immediately ahead of the covering operation. The geotextile shall not be left exposed to sunlight during installation for a total of more than 14 calendar days. The geotextile shall be laid smooth without excessive wrinkles. Under no circumstances shall the geotextile be dragged through mud or over sharp objects which could damage the geotextile. The cover material shall be placed on the geotextile such that the minimum initial lift thickness required remains between the Equipment tires or tracks and the geotextile at all times. Construction vehicles on the first lift above the geotextile will not be permitted.

Soil piles or the manufacturer’s recommended method, shall be used as needed to hold the geotextile in place until the specified cover material is placed.

Should the geotextile be torn, punctured, or the overlaps or sewn joints disturbed, as evidenced by visible geotextile damage, Subgrade pumping, intrusion, or roadbed distortion, the backfill around the damaged or displaced area shall be removed and the damaged area repaired or replaced by the Contractor at no expense to the Owner. The repair shall consist of a patch of the same type of geotextile placed over the damaged area by the minimum required overlap for the application.

If geotextile seams are to be sewn in the field or at the factory, the seams shall consist of one row of stitching unless the geotextile where the seam is to be sewn does not have a selvage edge. If a selvage edge is not present, the seams shall consist of two parallel rows of stitching, or shall consist of a J-seam, Type SSn-1, using a single row of stitching. The two rows of stitching shall be 1.0 inch apart with a tolerance of plus or minus 0.5 inch and shall not cross except for restitching. The stitching shall be a lock-type stitch. The minimum seam allowance, i.e., the minimum distance from the geotextile edge to the stitch line nearest to that edge, shall be 1-1/2 inches if a flat or prayer seam, Type Ssa-2, is used. The minimum seam allowance for all other seam types shall be 1.0 inch. The seam, stitch type, and the equipment used to perform the stitching shall be as recommended by the manufacturer of the geotextile and as approved by the Engineer.

The seams shall be sewn in such a manner that the seam can be inspected readily by the Engineer or a representative. The seam strength will be tested and shall meet the requirements stated herein.

2-12.3(2) UNDERGROUND DRAINAGE

Trench walls shall be smooth and stable. The geotextile shall be placed in a manner which ensures intimate contact between the soil and the geotextile (i.e., no voids, folds, or wrinkles).

The geotextile shall either be overlapped a minimum of 12 inches at all longitudinal and transverse joints, or the geotextile joints shall be sewn for medium survivability drainage applications. In those cases where the trench width is less than 12 inches, the minimum overlap shall be the trench width.

In moderate survivability geotextile underdrain applications, the minimum overlap shall be 12 inches, or the geotextile joints shall be sewn, except where the geotextile is used in area drains. An area drain is defined as a geotextile layer placed over or under a horizontal to moderately sloping layer of drainage aggregate. For area drains, the geotextile shall be overlapped a minimum of 2 feet at all longitudinal and transverse joints, or the geotextile joints shall be sewn together. The minimum initial lift thickness over the geotextile in the area drain shall be 12 inches.

In all cases, the upstream geotextile sheet shall overlap the next downstream sheet.

2-12.3(3) SEPARATION

The geotextile shall either be overlapped a minimum of 2 feet at all longitudinal and transverse joints, or the geotextile joints shall be sewn together. The initial lift thickness shall be 6 inches or more.

2-12.3(4) SOIL STABILIZATION

The geotextile shall either be overlapped a minimum of 2 feet at all longitudinal and transverse joints, or the geotextile shall be sewn together. The initial lift thickness shall be 12 inches or more. Compaction of the first lift above the geotextile shall be by Method A (Section 2-03.3(14)D). No vibratory compaction will be allowed on the first lift.

2-12.3(5) PERMANENT EROSION CONTROL AND DITCH LINING

Unless otherwise specified in the Contract, the geotextile shall either be overlapped a minimum of 2 feet at all longitudinal and transverse joints, or the geotextile joints shall be sewn together. If overlapped, the geotextile shall be placed so that the upstream strip of geotextile overlaps the next downstream strip. When placed on slopes, each strip shall overlap the next downhill strip.

Placement of aggregate and riprap of other cover material on the geotextile shall start at the toe of the slope and proceed upwards. The geotextile shall be keyed at the top and the toe of the slope as shown on the Drawings. The geotextile shall be secured to the slope, but shall be secured loosely enough so that the geotextile does not tear when the riprap or other cover material is placed on the geotextile. The geotextile shall not be keyed at the top of the slope until the riprap or other cover material is in place to the top of the slope.

All voids in the riprap or other material that allow the geotextile to be visible shall be backfilled with quarry spalls or filter material as designated in the Contract, so that the geotextile is completely covered. When an aggregate cushion between the geotextile and the riprap or other cover material is required, it shall have a minimum thickness of 12 inches.

An aggregate cushion shall be placed on the geotextile when hand placed riprap or sack riprap is specified.

Grading of slopes after placement of the riprap or other cover Material will not be allowed if grading results in stone movement directly on the geotextile. Under no circumstances shall stones with a weight of more than 100 pounds be allowed to roll downslope. Stones shall not be dropped from a height greater than 3 feet above the geotextile surface if an aggregate cushion is present, or 1 foot if an aggregate cushion is not present. Lower drop heights may be required if geotextile damage from the stones is evident, as determined by the Engineer. If the geotextile is placed on slopes steeper than 2H:1V, the stones shall be placed on the slope without free-fall for moderate survivability, high survivability, and ditch lining geotextiles.

2-12.3(6) TEMPORARY SILT FENCES

2-12.3(6)A GENERAL

The Contractor shall install and maintain silt fences at the locations shown on the Drawings. The silt fences shall be constructed in the areas of clearing, grading, or drainage prior to starting those activities. A silt fence shall not be considered temporary if the silt fence *is required to* function beyond the life of the Contract. The silt fence shall prevent soil carried by runoff water from going beneath, through, or over the top of the silt fence, but shall allow the water to pass through the fence. *Silt fences shall not be placed across streams or ditches.* The minimum height of the top of silt fence shall be 2-1/2 feet and the maximum height shall be 3 feet above the original ground surface. *Damaged or improperly functioning portions of silt fences shall be repaired or replaced by the Contractor at no cost to the Owner*. The silt fence shall be maintained until vegetation has been established.

The geotextile shall be attached on the up-slope side of the posts and support systems with staples, wire, or in accordance with the manufacturer's recommendations. The geotextiles shall be attached to the posts in a manner which reduces the potential for geotextile tearing at the staples, wire, or other connection device. Silt fence back-up support for the geotextile in the form of wire or plastic mesh is optional, depending on the properties of the geotextile selected for use in Table 6 in Section 9-05.22. If wire or plastic back-up mesh is used, the mesh shall be fastened securely to the up-slope of the posts with the geotextile being up-slope of the mesh back-up support.

The geotextile shall be sewn together at the point of manufacture, or at an approved location as determined by the Engineer, to form geotextile lengths as required. All sewn seams shall be located at a support post. Alternatively, two sections of silt fence can be overlapped, provided the Contractor can demonstrate *acceptable results* to the Engineer, that the overlap is long enough and that the adjacent fence sections are close enough together to prevent silt laden water from escaping through the fence at the overlap.

The geotextile at the bottom of the fence shall be buried in a trench to a minimum depth of 6 inches below the ground surface. The trench shall be backfilled and the soil tamped in place over the buried portion of the geotextile as shown on the Drawings, such that no flow can pass beneath the fence nor scour occur. When wire or polymeric back-up support mesh is used, the wire or polymeric mesh shall extend into the trench a minimum of 3 inches. The fence posts shall be placed or

driven a minimum of 1-1/2 feet into the ground. Fence post depths shall be increased by 6 inches if the fence is located on slopes of 3H:1V or steeper and the slope is perpendicular to the fence. If required post depths cannot be obtained, the posts shall be adequately secured by bracing or guying to prevent overturning of the fence due to sediment loading, as approved by the Engineer.

Silt fences shall be located on contour as much as possible, except at the ends of the fence, where the fence shall be turned uphill such that the silt fence captures the runoff water and prevents water from flowing around the end of the fence as shown on the Drawings. If the fence *crosses* contours, with the exception of the ends of the fence, gravel check dams placed perpendicular to the back of the fence shall be used to minimize concentrated flow and erosion along the back of the fence. The gravel check dams shall be approximately 1 foot deep at the back of the fence and be continued perpendicular to the fence at the same elevation until the top of the check dam intercepts the ground surface behind the fence as shown on the Drawings. The gravel check dams shall consist of crushed surfacing base course gravel backfill for walls, or shoulder ballast. The gravel check dams shall be located every 10 feet along the fence where the fence *crosses* contours. The slope of the fence line where contours *are* crossed shall not be steeper than 3H:1V.

Sediment deposits shall be periodically removed each occurrence when the deposit reaches approximately one-third the height of the silt fence at any location along the fence.

2-12.3(6)B POSTS

Either wood or steel posts shall be used. Hardwood posts shall have minimum dimensions of 1-1/4 inches by 1-1/4 by the minimum length shown on the Drawings, and shall be free of defects such as knots, splits, or gouges. If fir or hemlock is used (stud grade), the posts shall have minimum dimensions of 1-1/2 inches by 3 inches. Steel posts shall consist of either:

1 ASTM A 53 steel pipe with a minimum diameter of 1 inch; *or*
2 U, T, L, or C shape steel posts with a minimum weight of 1.35 lbs./ft; or
3 Other steel posts having equivalent strength and bending resistance to the post sizes listed.

The spacing of the support posts shall be a maximum of 6 feet as shown on the Drawings.

Fence back-up support, if used, shall consist of steel wire with a maximum mesh spacing of 2 inches, or a prefabricated polymeric mesh. The strength of the wire or polymeric mesh shall be equivalent to or greater than that required in Table 6 for unsupported geotextile (i.e., 180 lbs. grab tensile strength). The polymeric mesh shall be as resistant to ultraviolet radiation as the geotextile it supports.

2-12.4 MEASUREMENT

Bid items of Work completed pursuant to *the Contract* will be measured as provided in Section 1-09.1, Measurement of Quantities, unless otherwise provided for by individual measurement paragraphs *herein* this Section.

Construction geotextile, with the exception of temporary silt fence geotextile and underground drainage geotextile used in trench drains, will be measured by the square yard for the ground surface area actually covered. No additional measurement will be made for overlap.

Temporary silt fence geotextile will be measured by the linear foot of completed fence along the ground line.

Underground drainage geotextile used in trench drains will be measured by the square yard for the perimeter of drain actually covered. *No additional measurement will be made for overlap*.

2-12.5 PAYMENT

Compensation for the cost necessary to complete the work described in Section 2-12 will be made at the Bid item prices Bid only for the Bid items listed or referenced as follows:

1. "**Construction Geotextile for Underground Drainage**", per square yard.
2. "**Construction Geotextile for Separation**", per square yard.
3. "**Construction Geotextile for Soil Stabilization**", per square yard.
4. "**Construction Geotextile for Permanent Erosion Control**", per square yard.
5. "**Construction Geotextile for Ditch Lining**", per square yard.
6. "**Construction Geotextile for Temporary Silt Fence**", per *linear foot*.

The Bid item prices for "Construction Geotextile (Use)" shall include all costs for the work required to furnish, install, maintain, and remove the geotextile for the use as specified.

7. **Other payment information**.

Sediment removal behind silt fences will be paid in accordance with Section 1-09.4 under temporary water pollution/erosion control unless the Contract specifies otherwise. If a new silt fence is installed in lieu of sediment removal, the silt fence will be paid for in accordance with Section 1-09.4.

Additional geotextile ordered by the Engineer will be addressed in accordance with Section 1-04.4.